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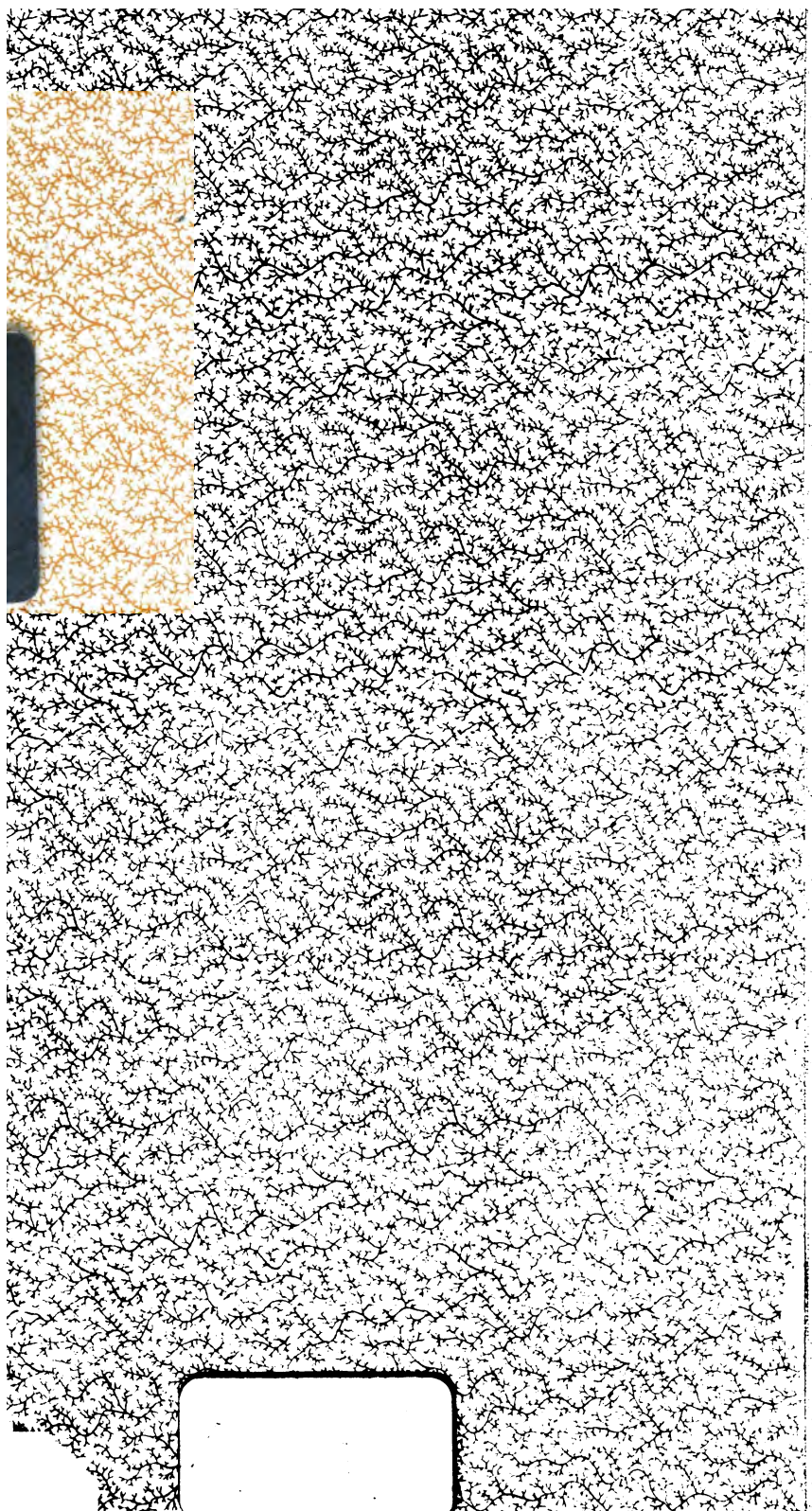
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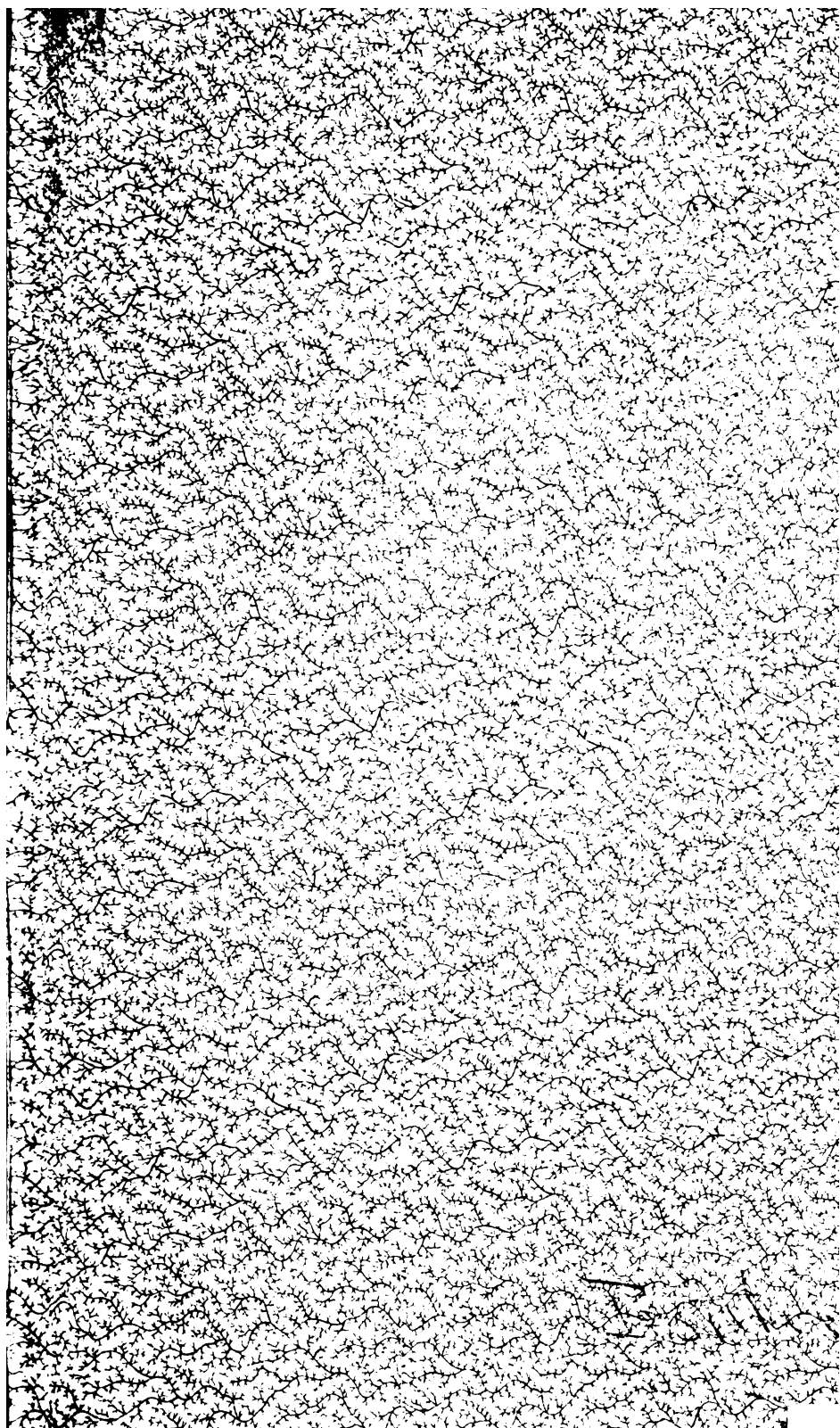
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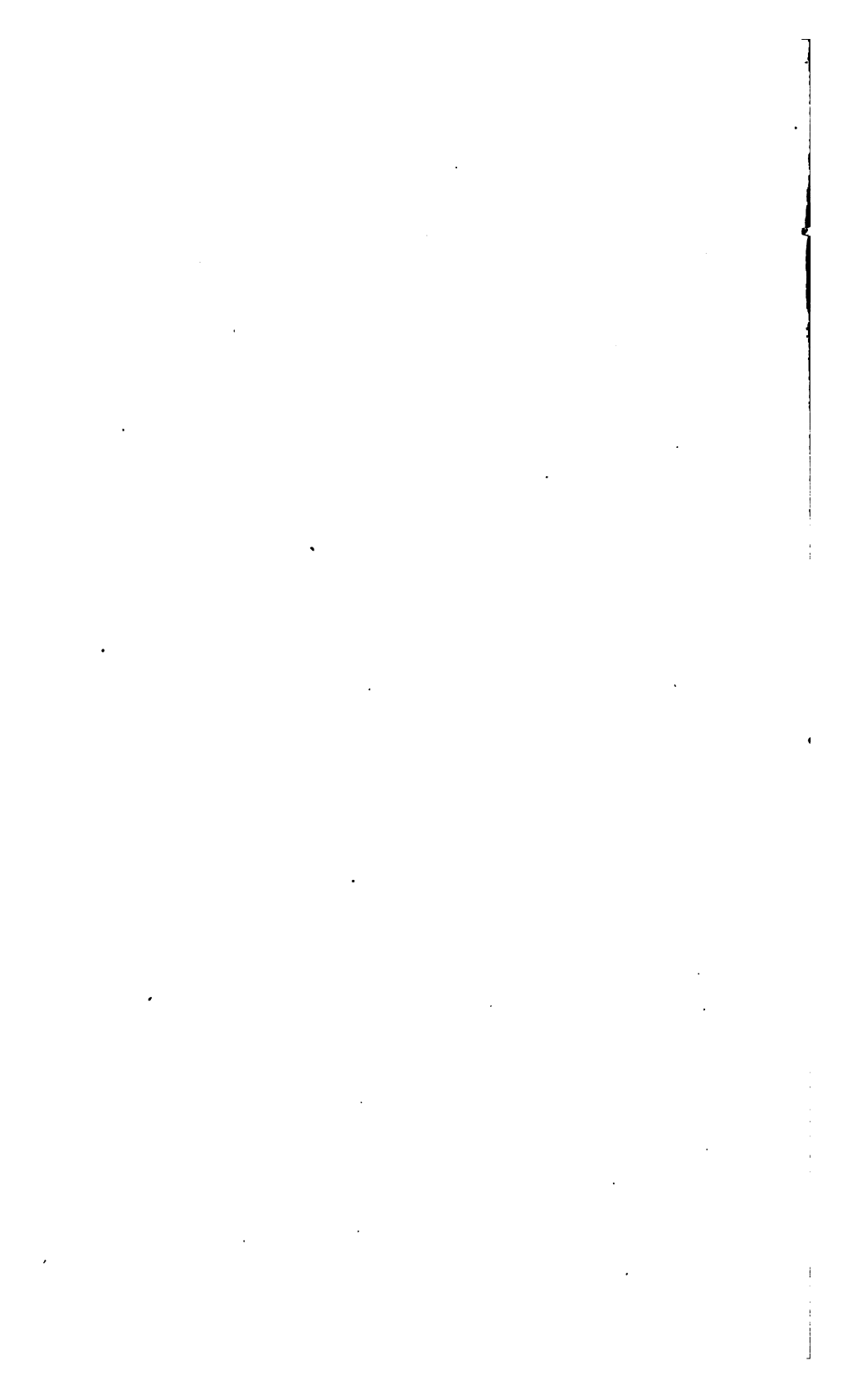
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THE  
ASSURANCE MAGAZINE,  
AND  
JOURNAL  
OF THE  
INSTITUTE OF ACTUARIES.

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VOL. IV.

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LONDON:  
CHARLES & EDWIN LAYTON, 150, FLEET STREET.

EDINBURGH: KENNEDY. NEW YORK: H. BAILLIÈRE, 290, BROADWAY.

PARIS: J. B. BAILLIÈRE, LIBRAIRE, RUE HAUTEFEUILLE.

HAMBURG: PERTHES, BESSER, & MAUKE.

1854.



10724.

[ENTERED AT STATIONERS' HALL.]

LONDON:  
PRINTED BY CHARLES AND EDWIN LAYTON,  
150, FLEET STREET.

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THE  
ASSURANCE MAGAZINE,  
AND JOURNAL OF  
THE INSTITUTE OF ACTUARIES.

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*On the Inadequacy of existing Data for determining the Rate of Mortality among Select Lives. By WILLIAM SPENS, Esq.,  
Manager of the Scottish Amicable Life Assurance Society.*

[Read before the Institute 27th June, 1853, and ordered by the Council to be printed.]

I. WHILE so much improvement has recently taken place in the arrangement and construction of various tables for facilitating calculations founded on existing data, very little has been done in the way of investigating and correcting the data themselves; and it is feared that the question of the rate of mortality among select lives is still involved in the greatest doubt and obscurity.

II. It is not proposed in the present paper to go farther than to show that the rate of mortality, during the first year of selection, of select assured lives is so materially different from what it has hitherto been represented, as to lead to the inference that the data from which the erroneous deduction has been made cannot be true data for the ascertainment of the value of selection. To investigate the rate of mortality of select lives at separate ages, I conceive to be of the utmost importance for the elucidation of truth, and the proper direction of sanatory inquiries; but I do not consider that sufficient data at present exist for the determination of this, and these can only be obtained by a united inquiry. I shall be very happy if the present observations have any effect in hastening such an investigation, which sooner or later must be entered upon.

III. So far as I am aware, the only data which have hitherto been founded on, as determining the rate of mortality among select

lives, are those derived from the experience of seventeen Life Offices, generally known as the "Experience" data. Taking, then, the adequacy of these data for giving a solution of the question of the value of selection, or the rate of mortality, during the first year, as the subject for consideration, we shall first place distinctly before us the data to be impugned. The classes where the position of the policies is exhibited from year to year are—

				Policies.
A1 and A4—Male and female lives—Town . . .				17,545
A2 and A5	Do.	do.	Country . .	13,835
				<hr/>
				31,380
A2 and A6	Do.	do.	Irish . . .	9,236
				<hr/>
				40,616
"Equitable"	Do.	do.	.....	21,398
				<hr/>
				62,014

These are the policies which Mr. Farren has in view in his elaborate treatise "On the Chances of Premature Death and the Value of Selection among Assured Lives, in determining the Rate of Mortality among select assured lives during the first year after selection." Now in regard to the Irish lives, I think it is quite unnecessary to say anything. I have no doubt that as good business can be done in Ireland as is effected in this country; but I do not think there is anyone whom I now address who will for one moment consider the Irish lives, as contained in the Experience Tables, worth anything as data for ascertaining the value of selection. Mr. Higham, who has treated the subject in so masterly a manner in his paper of 31st March, 1851, at once dismissed these lives as inapplicable to the question. In regard to the Equitable lives, I do not dispute their bearing on the point.

The lives to be considered are therefore the 31,380 A1 & A4 and A2 & A5. Referring to page 15 of Mr. Farren's treatise, the deaths among these during the calendar year of their admission amount to 108, and during the first calendar year after admission to 302. According to the mode in which Mr. Farren has proceeded, taking the mortality in the first calendar year after admission, after making the necessary corrections for discontinued and current policies, the rate of mortality is 1·13 per cent.; but this, no doubt, may fairly be presumed to be an overstatement of the rate during the actual first year of selection. If we assume that during the first calendar year of admission the mortality is experi-

enced for half a year, the per centage for this period would be at the rate of 692 per annum. The average of the first calendar year thus assumed to be the first six months, and of the succeeding twelve months, being the first calendar year after entry, is thus 911 per cent.; but this, looking to the increasing ratio of mortality observed and to be expected, is no doubt too great, and I would put down 825 per cent. as not too much for the probable rate of per centage of mortality during the first year of selection, indicated by the lives under consideration.

IV. I still continue to think that the arrangement of the "Experience" data by policies instead of persons is very detrimental to their value and authority, especially where such points as the present are involved. The general deductions of expectation of life may not be very seriously affected; but for any separate age, or for any isolated question like this, I fear that this mode of arrangement has rendered them almost valueless. I formerly noticed an instance of probable great error in consequence of this among the Irish male lives, where there are represented to be 13 deaths at age 40 in the first calendar year after entry, among 347 lives at entry. I may notice another instance among the same lives, at age 62, fourth year after entry, where 9 deaths are represented. I am informed, from a source which leaves no doubt of the accuracy of the statement, that out of these 9 there were at least 6 on the same life.

V. From what has been said above, and from casual observation of other mortality, having so much doubt of the "Experience" data, I thought it desirable to test the value of the experience, in reference to the mortality during the first year of selection, by the collection of data derived from other experience; and the result has convinced me that what has been said above cannot altogether account for the very great difference that is shown, and that, whether from the examination of the lives having been less carefully attended to, or whether from any other cause, the "Experience" lives do not afford data for determining questions on the value of select lives.

The Offices which have been so good as to furnish me with their experience of the capital sums of policies assured which had fallen by death within a year of the assurance, are as follow:—The Royal Exchange (for a certain period), the Scottish Widows' Fund, the Law Life, the Standard, the Scottish Equitable, the Scottish Provident, the Life Association of Scotland, the City of Glasgow, the Colonial, and the Scottish Amicable. The amount of capital

sums assured which has fallen by death among these Offices within the first year is £255,977, the gross amount of the assurances is upwards of £50,000,000, which would give a per centage on the amount assured of  $\cdot 512$ ; but as it does not appear that a deduction has been made for current business, to cover any other contingencies and to be sure to be within the mark, let the amount be stated at £46,541,272, which gives a rate of  $\cdot 55$  per cent. The London Equitable "Experience," not in the first year of entry, but in the first calendar year after entry, shows a rate of mortality of almost exactly  $\cdot 5$  per cent.; and though there is a slight preponderance of young lives, there is nothing to prevent the experience of the Equitable being held as fully confirming the above rate as not greater than the actual mortality among select lives, or say select assured lives; for I doubt not the rate would be considerably reduced if the selection were made irrespective of the desire to obtain business.

VI. It may be asked why I have got the information in reference to the sums assured, and not the individuals. One reason was, that I believed the return could be more easily made; and, on the whole, I am inclined to think that no error of any consequence can have arisen from estimating the rate of mortality in this manner; and had the "Experience" data been made out in this way, I believe they would have represented the truth with much more accuracy—at all events, it is obvious they would have represented, so to speak, the financial mortality.

VII. In a paper by Mr. Neison, in the *Statistical Journal*, December, 1850, vol. xiii., the deaths in the Gotha Life Assurance are thus stated:—

Year.	Table VIII.	Table XV.	Difference.
1840	143	136	7
1841	164	158	6
1842	198	191	7
1843	203	201	2
1844	200	197	3
1845	238	235	3
1846	229	224	5
1847	293	289	4
1848	339	325	14
1849	337	337	0
	2344	2293	51
	2293		
	51		

Looking to these differences, and to the fact that Table VIII. gives



the deaths after the *lapse* of one, two, &c. years, I infer that 51 will be the number who have died in these years within twelve months from the date of assurance. I also suppose that the 51 deaths have occurred among about the following, per column 2 of Table XV.:—

1839 (Half of) .....	512
1840 .....	1,089
1841 .....	983
1842 .....	1,013
1843 .....	1,049
1844 .....	1,073
1845 .....	1,018
1846 .....	1,096
1847 .....	1,235
1848 .....	824
1849 (Half of) .....	505

---

10,397

If these assumptions, which are certainly not improbable, be correct, it will be observed that the per centage 51 out of about 10,397 is just about  $\cdot 5$ , or the same as the Equitable experience.

VIII. We have now seen that the real mortality among the general mass of select assured lives, during the first year, cannot be estimated as greater than  $\cdot 55$  per cent., while the rate on the 31,380 A1 & A4 and A2 & A5 class of lives is  $\cdot 825$ , or 50 per cent. more; and therefore, feeling the full force of what is stated in Mr. Farren's paper "On the Reliability of Data, when tested by the conclusions to which they lead," I think it clear that these 31,380 lives do not afford correct data for the ascertainment of the rate of mortality during the first year of select assured lives.

IX. In Mr. Farren's treatise "On the Chances of Premature Death," he gives the mortality during the first calendar year among the lives first mentioned, combined with the Irish and the Equitable, as 1.0356 for A1; and the Table A which he has deduced from the data afforded by these lives and the London Amicable, "showing the rates of mortality occurring among assured lives during the first year of selection, or the chances of premature death," commences at age 21 with a rate of mortality of  $\cdot 5891$ , and ends at age 70 with a rate of 5.4382.

The following are the rates:—

Age.	Rate of Mortality.
21 .....	$\cdot 5891$
45 .....	1.0877
60 .....	2.8368
70 .....	5.4382

Now I have not one word to say against these results being correctly deduced from the data on which they are founded. Mr. Farren's well known mathematical attainments preclude any contrary supposition, and it would be to no purpose that one so much less qualified than himself should argue against the principles on which the conclusion is arrived at; but it is my argument, that they are the correct deductions, reasoning from the data, assuming them to be correct data. And this deduction being that there is an increasing rate of mortality among select assured lives during the first year, commencing with 5891 at age 21 (while, as we have seen above, among a very large mass of experience the general rate over the whole lives of the first year is less than this), we must again decide that his data cannot be true for ascertaining the value of life during the first year of selection.

X. In a paper read before the Institute on November 25, 1850, discussing the question whether there is a materially greater risk on the assurance of a select life of from 40 to 45 than of a select life of from 20 to 25 for one year, I endeavoured to show

1st, That no data had been exhibited to justify the assumption made, that there was a materially increased risk among the older lives;

2nd, That the data, so far as they extended, showed no difference in the rate of mortality; and,

3rd, That therefore the assumption made of the increased risk among the older lives must be founded on the general tables of mortality, which I thought could not be held as furnishing data for a solution of the question.

In Mr. Farren's paper already alluded to, "On the Reliability of Data," read before the Institute 25th March, 1853, and published in the *Assurance Magazine*, No. XI., he states that I have announced that the experience of certain Scotch Offices will be found confirmatory of the opinion that there is no material difference in risk for one year on the lives above mentioned. Now I have nowhere intimated that I was to bring other experience to bear directly on the point; and Mr. Farren must have misunderstood something stated by me, if he has so taken up anything I said in my former paper, or in the correspondence I have had the pleasure of carrying on with him. All that I proposed to do I believe I have now done. I have shown, it appears to me most clearly, that the data on which he has founded his tables cannot be accepted as worth anything for the ascertainment of the chances of premature death among select lives, and that the special question

which I made the subject of my paper of 25th November, 1850, rests where I placed it, as above stated.\*

The real principle involved in the question as to the comparative mortality between select lives of age 20 to 25 and those from 40 to 45 is well put by Mr. Farren when he says "that, however firmly a man may appear to be in possession of what is called select health, yet that he is still infected with the disease called time or age, and that, when seeking a year's or a day's, nay, even a moment's insurance, should be relatively charged in that respect." This is a clear, distinct, well defined proposition; but I believe it to be quite erroneous. A year may or may not be too long a period to place the two sets of lives on a parity as to risk; but in reference to a day, multiply the lives by millions, and I am sure there will be no difference—indeed, it will come nearly to be a question of the liability to accident: and I believe that, so far as a day's risk is concerned, there would be less chance of death among many parties lying on their death beds, than among the healthy. That the relative number of the dying to the living increases with age, irrespective of selection, let us admit; but that proves nothing.

I do not assert that I have *proved* there is no material difference of risk for a year in select lives from 20 to 25 and from 40 to 45. My belief is that it is so; and there can be no question that the doctrine, however my respected friend may ridicule it, is much more near the truth than what he has deduced from the data, which it has been the object of this paper to show can have little or no bearing on the point. It is, I think, proved, that *however* the mortality be divided, the average on the whole is less than what he begins with at age 21. It further would seem consistent with all reason that the power of selection should operate in an increasing ratio with the age. The data founded on by Mr. Farren have led him to the conclusion that the difference between the mortality among the select lives and the lives of the ordinary population increases up to age 41, and after that diminishes till age 54, when there is no difference—then increases again—very gradually, however, the rate of mortality at age 61 being represented as 3 per cent. These conclusions I believe to be entirely fabulous, but correctly deduced; and hence again I maintain the data to be worthless for the purpose in view.

\* I must here notice an error in my former paper alluded to. In the fifth section I have erroneously stated the deaths out of 8781 lives in the "Equitable," up to age 32 inclusive, as 29 in place of 27. This very considerably, if not entirely, alters the statement in the concluding paragraph of that section; and I will feel obliged by anyone who has preserved his copy, correcting the 29 into 27, and then deleting the whole paragraph.

In place of 3 per cent., I believe the rate of mortality during the first year of selection, among select lives of 61, to be much nearer 1 per cent. Among 440 lives in the "*Equitable*" at 61 and upwards, the deaths were only 4, or less than 1 per cent. I have been furnished with the experience of 327 lives, selected in Scotland for investment in Government Annuities, at ages from 61 to 64. Of these, 249 had stood the chance of death for a whole year, and 78 for three quarters of a year. The deaths were 2, being at the rate of .656 per cent. per annum. Here is the experience of upwards of 700 lives, the greater proportion above 61. What, again, is the experience on which Mr. Farren founds, at ages 61 to 64? The lives are about 1,440, including 330 "*Equitable*," and the deaths about 44, or a little more than 3 per cent.; but while this in itself appears to be a most improbable result, and throws discredit on the value of the experience for the ascertainment of the chance of premature death, this view is much strengthened when we find that out of 420 Irish lives entered at these ages, their proportion of the 44 deaths is 18—about three times greater than the number from more than 700 lives, out of which only 6 deaths took place, as above. Among the male lives (town) I also observe 4 deaths, out of 45 entered at age 64; and among the male lives (country) 5 deaths, out of 64 entered at age 63. In these two cases it is probable that there are several policies on the same life. In my former paper, I pointed out as a startling result that the "*Amicable*" experience showed a mortality of 1 per cent., and the "*Equitable*" of 1.1 per cent., on all lives above 45. At the time, I was afraid to found on such a result; but the rate of mortality here shown for the whole of assured lives, and what has been said as to 61 to 64 lives, would almost lead to the supposition of 1.1 per cent. being an overstatement. It would seem that the number of assurances above age 45 may be taken as about one third of those at or under 45. Now, if we take 30,000 lives at and under 45, and 10,000 above 45 (40,000), and the rate of mortality .55 during the first year, as per Section V., the deaths altogether would be 220; and if we take those above 45 as 1 per cent., this would be 100; leaving 120 for the lives at or under 45, or .4 per cent.: and I cannot suppose the real mortality at ages 20 to 25 materially less, nor the rate at 40 to 45 materially more. This gives a general indication that the idea that there is no material difference between the mortality at 20 to 25 and 40 to 45 cannot be far from the truth.

Now, of course I do not put these forward as precise results;

but I do not well see how any correction can be made on them which will have the effect of showing any plausible ground for maintaining, contrary to the "Equitable" experience, the doctrine of a material difference between the mortality during the first year of selection of a life from 40 to 45 and one from 20 to 25.

In this supposition itself there does not seem to be anything repugnant to common sense. We are doubtless born with the elements of decay, but at the same time we do not believe it is mere common error to talk of man being at his prime at a considerable period beyond manhood; nor can we be brought to believe, whatever results it may lead to, and whatever theories it may contradict, that there is a material difference in the risk of death for a day among select, young, and even old lives. In regard to mortality in general, while fully acknowledging the overruling power of Providence, we must all admit that much has been left in our own hands—individually, as regards temperance, moderation, contentment, and proper caution; and collectively in the alleviation and removal of those general causes of disease and death, which, especially in badly drained and ill ventilated cities, subject the population to an extra mortality, probably greater than would be produced by the annual bombardment of a hostile force. The more we can exhibit true statistics of mortality, the more shall we be led to discover, appreciate, and endeavour to mitigate those evils which so unnecessarily swell our registers with deaths in early and mature life; but if we allow theories to overrule actual observed facts, we know not what remedies we may lose sight of, nor into what erroneous channels we may be led.

I will now leave the subject, feeling how very imperfectly I have handled it, but hoping that Mr. Farren may at least see that the foundation on which he has reared so elegant a superstructure cannot support it. If he should be persuaded of this, he will not allow his opinions in regard to the chances of premature death among select lives to remain recorded as they stand at present; and in that case, I am sure the subject will then be properly investigated by one competent to do it ample justice.

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NOTE.—We should have felt ourselves called upon to make some observations upon this paper had we not been favoured with the comments upon it by Mr. Farren, which appear at p. 66 of this Number, and to which we beg especially to draw the reader's attention.—*Ed. A. M.*

*On the Sufficiency of the existing Companies for the Business of Life Assurance; with a List of the Companies at the end of 1852, their Guaranteed and Paid-up Share Capital, &c.* By SAMUEL BROWN, F.S.S.

THE question is frequently asked, in what respect competition in life assurance business differs from that in any other trade or profession. It is contended, that in trade the effect of competition is to produce a better article at a lower price—to awaken new tastes and desires in the public, and so to create a market, which, notwithstanding the diminution in the price, may afford larger profits to the merchant, by the greater quantity of the commodity which he can sell or the greater frequency with which his capital may be turned. But there is nothing analogous to this in life assurance, for in truth it is nothing more than a redistribution of the capital of the public—a deduction of the portion which one man may save out of his profits in the course of a long life, for the benefit of the family of another who does not live to save it. Since neither of these two can tell who will gain and who will lose, they compound the matter by dividing the average of the gain and loss between them. There can be no buying or selling “life assurance,” in the sense in which the word traffic is used in ordinary trade. If the annual premium (or in other words, the equivalent for the capital saved) would not, at the rate of interest and the mortality assumed, equal the capital in the long run, no body of shareholders would ever be found with purses deep enough to meet the deficiency. If under such circumstances they were prepared to pay every loss, it would be the interest of all other Companies, proprietary and mutual, to reassure their whole business with them, and the end would be inevitable ruin. We see, therefore, at the very outset, a broad distinction between competition in trade and competition in life assurance. The cost of production in the former may be diminished by the profits creating capital, which may be employed to bring more skilled labour into the field; and by subdivision of labour in the several processes, and thus by the saving of time and toil, still further cheapen the cost of production, and increase the profits on the sale. But the assurance of life depends upon laws of population and of interest of money, quite beyond the control of those who guarantee the fulfilment of the contracts. The conclusion, in fact, is singularly opposed to the doctrines of trade; for the more capital the adventurers employ, the less profit they obtain. The scientific knowledge and skill which are engaged are devoted only to ascertain the true law of nature



by which the contracts are governed, not with the least hope of being able to vary it when discovered. The nearest approach to bringing skill to bear in the production of profits, in this branch of business, is by engaging the best medical advice to succeed in the selection of the best lives. This advice however is so uncertain, that we frequently observe lives declined in one Office taken in another at the ordinary premium, with expressions of astonishment at their former rejection, and in many cases without the bad results anticipated by the former Office. It probably arises from the fact that an individual not in the enjoyment of the most robust health is more careful of himself, and more attentive to those aids to prolongation of life which the strong and vigorous pay little or no regard to. But after all, the result of this selection comes simply to ascertaining the true law of mortality amongst a class of lives different from the average; and for whom, consequently, the premium charged, being based upon the average, does not apply.

The effect of competition amongst Companies obtaining this better class of lives would be to reduce the premium; but any relaxation of the vigilance which created the profit would, in that case, end in a loss. A still more serious result might be, that other Companies, less careful, but arguing from the experience of the former that the rate of mortality in general was greatly diminished, might vote for reduction of premium too; when, having only a worse class of lives left, they ought, by the very reasoning which led to the diminution in the former case, protect themselves by an increase of their rates in the latter. It is evident that all cannot have the best lives; and if the benefits of life assurance be extended to the whole population, the average mortality, after all, must be the average of the nation. The same reasoning applies to the interest of money. The rate is no more capable of being increased by the competition of Companies, in consequence of the increase of capital brought into play, than the mortality is capable of being diminished by the same means. On the contrary, by applying the ordinary principles of political economy, the very opposite might be expected. The offer of a larger amount of capital to the public than would be called for by the ordinary demands of commerce, would diminish the interest which it would bear. What, therefore, would in another trade tend to increase the profits, by diminishing the cost of production, would in this business act in an opposite direction, to diminish the general interest of money, which is one of the sources of profits in a Life Assurance Company. The question, to what extent the large amount of share capital, and the much larger amount of accumu-

lated funds, have facilitated or altered the operations of trade, is a very curious and novel one, to which we are not yet in a position to offer any very satisfactory solution. The statistics of the life assurance business, I regret to say, are scarcely ascertainable, though they have so important a bearing both on the moral and commercial condition of the people. The large and old established Companies confine the employment of their funds, in a greater degree, to advances upon mortgage of real estate, or to purchases in the public funds; but the more recent Companies, by lending very extensively (though the actual amount is unknown) on personal security, have given facilities to the operations of trade, in many cases evidently forming a fictitious capital, by pledging the credit of friends and relations to be security that the loans so advanced shall be repaid out of the future results of the industry or skill of the borrower. This forms quite a new feature in life assurance. This system, indeed, is going far beyond adding to the trade capital of the country the mere accumulation of the savings of the nation, and is in fact equivalent to using their future savings as present trade capital. The question is new, and very important. In so far as it pledges the individual to save, it may, by encouraging habits of prudence and foresight, convert one who might have been a mere speculator into a steady and careful man of business. But may it not, on the other hand, have the effect of throwing more capital into commerce and manufactures than would have arisen for many years to come by the legitimate process of capital arising out of savings, and thus give a forced and unnatural character to the present state of trade? To return, however, to the question of interest of money, as affected by the competition of Companies: it is clear that the large amount of capital, either invested from payments on shares or accumulated from premiums, cannot have the effect of increasing the average rate of interest; and if not, that it must tend, in comparison with the earlier periods in the history of life assurance, seriously to injure the prospects and diminish the profits of existing Companies.

In arriving at the conclusion that the rates of mortality and of interest of money cannot by the formation of new Companies be altered favourably for them and the public, but rather that the latter, at least, may be turned against them, we naturally observe that there must be a certain limit at which the combined expenses of all the Companies would be equal to their combined profits. After this the formation of new Companies would end in a positive loss. Thus, if the business was so subdivided that the

expenses of each Company could not on the average be brought below 20 per cent. on the premiums, and the margin on the pure premium allowed only of 20 per cent. profit on the average, whatever some Companies gained would be to the positive detriment of others, whose capital would be swallowed up without any chance of restoring their position. It would, in fact, be placing them in the same situation as manufacturers of any particular article the price of which paid by the public was actually below the cost of production. No one would recommend that in such a case the number of manufacturers should be increased. The public would not gain in the end by the ruin of the individuals composing the class. It may be true that the business of life assurance has not yet arrived at this deplorable state; but that the total expense to the public has been of late years very greatly increased, not merely by the expenditure of newly formed Companies, but by the increased cost at which the older Companies are compelled to carry on their business, must be manifest to everyone who looks into the accounts or reflects on the consequences of the system advocated. If it was to be clearly understood that the greater part of the addition to a pure premium was to be taken for expenses, the public would begin to reflect whether it was advisable to encourage a system by which their savings were administered and subdivided for them at so great a charge. Would any prudent man, for instance, consider that if he could lay by a third of his income, and invest it in the Funds for the benefit of his family, it would be wise for him to hand over the care of investing it to a Company, who would deduct nearly 10 per cent. of his whole savings for the cost of accumulating it? Life assurance is no more than the investment of the savings of the public at the best interest that can be safely obtained, and the redistribution of them in different proportions.

The annual costs of all the number of Companies now in existence are, as nearly as can be ascertained, about the proportion above stated, or an average of 10 per cent. on the business actually existing. Admitting that this business could be doubled without increasing the expenses to each, and that no additional Company was formed, it would even then require 5 per cent. of the total receipts of premiums, or what may be on a general estimate considered as somewhat between a fifth and sixth part of all the average additions to the premiums. Looking at the expectations of the profits which the public have been led to entertain from the care and economy with which the Companies were formerly carried on, it would not seem unreasonable that the existing Companies

should be allowed to continue their operations with the chance of arriving at this degree of success. The continual accession of new Companies cannot but place them in a worse position than at the present moment, when almost a third of all the profits is expended in the management of the existing business.

Even if it were possible to hope that no new Company were to start till the present amount of business was doubled—a case which, I admit, it is impossible to contemplate, because such forced restriction is contrary to all our received notions of freedom of trade—still it would be absurd to talk of monopoly, with now upwards of 180 Companies of all kinds in the field, competing against each other, and offering to the public every combination of life assurance—every variety of schemes which the ingenuity of the most speculative could invent, and more, perhaps, than the caution of the more experienced could approve.

To show that the public have already not only ample “room and verge enough” for their choice, but are protected by an amount of guaranteed and paid-up capital which renders it quite unnecessary to desire more, I have compiled the following list of Life Assurance Companies existing about the end of 1852.

From this statement it appears that the total number of purely mutual Companies was 42, and of proprietary Companies or mutual Companies having a guarantee capital independent of the premium fund, 132; total, 174.

The combined share capital of 117 of the latter Companies is represented to be £72,391,740; and in 86 of these Companies, of which the nominal share capital was £60,971,740, the amount actually paid up, supposing all the shares to be issued, would be £8,057,240, which includes two Companies with large share capitals wholly paid up, and a few others in which the capital has been increased out of the profits.

The price of the shares is only given in the case of 71 Companies, in which the total amount paid up on the shares, supposing all to be issued, is £7,409,240, and the marketable value of which was, in May last, estimated at about £15,404,708.

It must be borne in mind that some of these Companies (marked \*) carry on the branches of fire and marine insurance also, and to their success in this business some portion of the increased value of the shares is to be attributed. I have no means of distinguishing the relative value attaching to the life assurance business only, and can merely draw attention to the fact.

Some of the particulars were obtained from the share lists of the day; others have been kindly furnished by the managers or

actuaries themselves, to whom I have in numerous instances to express my obligations for the readiness with which they have given the facts. The whole presents a picture of the activity and enterprise with which this branch of business has been extended; and suggests how little need there is for the alarm of those who consider that by placing any check on the continual formation of new Companies, the public will have to dread the effects of monopoly, or the sacrifice of their interests by their being placed in the hands of a few.

TABLE I.—Names of Life Assurance Companies existing at the end of 1852, ranged Alphabetically, with the Dates of Formation; being an Index for TABLE II., in which the Particulars are given under the Years in which the Companies were established.

Name of Company.	Date of Formation.	Name of Company.	Date of Formation.
Aberdeen . . . . .	1825	Commercial and General . . . . .	1841
Aberdeen Mutual Life . . . . .	1831	Consolidated Investment and Assurance . . . . .	1846
Accidental Death . . . . .	1849	County Life . . . . .	1849
Adamant . . . . .	1852	Counties Union . . . . .	1852
<i>Ægis</i> . . . . .	1849	Crown . . . . .	1825
Age . . . . .	1851	Defender . . . . .	1846
Agriculturist . . . . .	1845	Deposit and General . . . . .	1851
Albert . . . . .	1838	Eagle . . . . .	1807
Albion . . . . .	1805	East of England . . . . .	1849
Alfred . . . . .	1839	Economic . . . . .	1823
Alliance . . . . .	1824	Edinburgh . . . . .	1823
Amicable . . . . .	1706	Engineers' . . . . .	1848
Anchor . . . . .	1842	English and Cambrian . . . . .	1850
Argus . . . . .	1833	English and Scottish Law . . . . .	1839
Asylum . . . . .	1824	English Widows' Fund . . . . .	1847
Athenæum . . . . .	1851	Equity and Law . . . . .	1844
Atlas . . . . .	1808	Equitable . . . . .	1762
Beacon . . . . .	1852	Era . . . . .	1852
Birkbeck . . . . .	1852	European . . . . .	1819
Brighton and Sussex Mutual . . . . .	1846	English and Irish Church and University . . . . .	1852
Britannia . . . . .	1837	English and Foreign Life Assurance, Consolidated Annuity, Endowment and Mortgagors' Protection . . . . .	1852
British Commercial . . . . .	1820	Family Endowment . . . . .	1835
British Provident . . . . .	1850	Friends' Provident . . . . .	1832
British Empire Mutual . . . . .	1846	General . . . . .	1837
British Mutual . . . . .	1844	General Benefit . . . . .	1820
British Industry . . . . .	1852	Globe . . . . .	1803
Caledonian . . . . .	1805	Great Britain . . . . .	1844
Cambrian and Universal . . . . .	1849	Gresham . . . . .	1848
Catholic . . . . .	1846	Guardian . . . . .	1821
Church of England . . . . .	1840	Halifax, Bradford, and Keighley . . . . .	1845
Church of England Schoolmasters and Schoolmistresses' . . . . .	1849	Hand-in-Hand . . . . .	1836
Christian Mutual Provident . . . . .	1846	Home and Foreign . . . . .	1852
City of Glasgow . . . . .	1838	Hope . . . . .	1852
City of London . . . . .	1845		
Clergy Mutual . . . . .	1829		
Clerical, Medical, and General . . . . .	1824		
Colonial . . . . .	1846		

Name of Company.	Date of Formation.	Name of Company.	Date of Formation.
Householders' and General . . . . .	1852	Palladium . . . . .	1824
Imperial . . . . .	1820	Patriotic (of Dublin) . . . . .	1824
India and London . . . . .	1846	Pelican . . . . .	1797
Indisputable . . . . .	1848	Phoenix Life (Liverpool) . . . . .	1848
Industrial and General Life and } Deposit . . . . .	1849	Preserver . . . . .	1843
Kent Mutual . . . . .	1849	Prince of Wales . . . . .	1851
Law Life . . . . .	1823	Professional . . . . .	1847
Law Property and Trust . . . . .	1850	Promoter . . . . .	1826
Leeds and Yorkshire . . . . .	1824	Protestant Life & Fire Insurance } Association . . . . .	1852
Legal and Commercial . . . . .	1845	Provident . . . . .	1806
Legal and General . . . . .	1836	Provident Clerks' . . . . .	1840
Life Association of Scotland . . . . .	1839	Prudential Mutual . . . . .	1848
Liverpool and London . . . . .	1836	Railway Passengers' . . . . .	1849.
London Assurance Corporation . . . . .	1720	Railway and General Mutual } Provident, Benevolent, & Life }	1849
London and County . . . . .	1851	Reliance . . . . .	1840
London Monetary Advance . . . . .	1851	Rock . . . . .	1806
London and Provincial Joint Stock . . . . .	1847	Royal (Liverpool) . . . . .	1845
London and Provincial Law . . . . .	1845	Royal Exchange Corporation . . . . .	1720
London Life Association . . . . .	1806	Royal Farmers' . . . . .	1840
London Mutual Life & Guarantee . . . . .	1848	Royal Naval, Military, East } India, and General . . . . .	1837
London Exchange Advance Fund } and Life Assurance . . . . .	1852	Sceptre of England . . . . .	1852
Lancaster Insurance . . . . .	1852	Scottish Amicable . . . . .	1826
Marine Life and Casualty Mutual . . . . .	1852	Scottish Equitable . . . . .	1831
Maritime Assurance . . . . .	1852	Scottish Provident . . . . .	1837
Medical, Invalid, and General . . . . .	1841	Scottish Provincial . . . . .	1825
Medical, Legal, and General . . . . .	1846	Scottish Widows' Fund . . . . .	1815
Mentor . . . . .	1848	Scottish Union . . . . .	1824
Merchants' & Tradesmen's Mutual . . . . .	1844	Solicitors' and General . . . . .	1846
Metropolitan . . . . .	1835	Sovereign . . . . .	1845
Metropolitan Counties & General . . . . .	1848	Standard . . . . .	1825
Minerva . . . . .	1836	Star . . . . .	1843
Mitre . . . . .	1846	Sun . . . . .	1810
Monarch . . . . .	1835	Times Life and Guarantee . . . . .	1849
Morayshire . . . . .	1840	Trafalgar . . . . .	1850
Mutual . . . . .	1834	Union . . . . .	1714
National Assurance of Ireland . . . . .	1822	United Deposit (Edinburgh) . . . . .	1845
National Friendly Society . . . . .	1846	United Guarantee and Life . . . . .	1849
National Guardian . . . . .	1850	United Kingdom . . . . .	1834
National Insurance Investment . . . . .	1844	United Kingdom Temperance } and General Provident . . . . .	1840
National Life and Fire Insurance } Company of Scotland . . . . .	1841	Universal . . . . .	1834
National Loan Fund . . . . .	1837	University . . . . .	1825
National Life . . . . .	1830	United Kent . . . . .	1824
National Mercantile . . . . .	1837	United Mutual and General . . . . .	1849
National Provident . . . . .	1835	United Service and General Life } and Guarantee . . . . .	1851
National Provincial . . . . .	1851	Victoria . . . . .	1838
New Equitable . . . . .	1850	Waterloo . . . . .	1851
New Protector Life Assurance, } Mutual Aid, and Investment } Association . . . . .	1851	Wealeyan Provident . . . . .	1841
Newcastle-upon-Tyne . . . . .	1783	West of England . . . . .	1807
North British . . . . .	1809	Western . . . . .	1842
North of England . . . . .	1844	Westminster and General . . . . .	1836
Northern . . . . .	1836	Westminster . . . . .	1792
Norwich Union . . . . .	1808	Wellington . . . . .	1852
Nottinghamshire and Derbyshire . . . . .	1835	Yorkshire . . . . .	1824
Oak . . . . .	1851		



TABLE II.—List of Life Assurance Companies existing at the end of 1852, both Mutual and Proprietary, with the Guaranteed and Paid-up Share Capital of the latter.

[Those marked \* are Fire Insurance Companies also. Mutual Companies stated to have a Guarantee Capital in Shares are placed under the head of Proprietary Companies, which name is intended to include all having a Capital independent of the Premiums of Members.]

NAME OF COMPANY.	Date of Formation.		No. of Shares.	Amount of each Share.	Total Capital.	Total Capital paid up, supposing all the Shares to be issued.	Last Price, May, 1853.	Present Market Value of Shares.	Dividend.
	Mutual.	Proprietary.							
Amicable	1706			£.	£.	£.	£. s. d.	£.	
*Union (Life, 1813)	..	1714	1,500	20 - -	300,000	30,000	230 - -	345,000	10 per cent.
*London Assurance Corporation	..	1720							
*Royal Exchange Corporation	..	1720	..	..	689,220 (Stock)	689,220	233 - -	1,605,883	5 per cent., and bonus.
Equitable	1762								
*Newcastle-upon-Tyne	..	1783			300,000	50,000	£4,850	242,500	
Westminster	..	1792	50	£1,000	1,000,000	(orig) 45,000	45 - -	210,510	4 per cent.
Pelican	..	1797	4,678	..	1,000,000	1,000,000	151 10 -	1,515,000	6 per cent.
*Globe	..	1803	..	..	(Stock)				
Albion	..	1805	2,000	50 - -	1,000,000	100,000	90 - -	180,000	6 per cent., and bonus.
*Caledonian	..	1805	1,500	10 - -	150,000	15,000	26 5 -	39,375	
London Life Association	1806				250,000	25,000	40 - -	100,000	£1. 5s. per share.
Provident	..	1806		..	600,000				
*West of England	..	1806	200,000	5 - 10 -	1,000,000	100,000	8 17 6	1,775,000	
Rock	..	1806		..	2,000,000	200,000	7 5 -	290,000	5 per cent.
Eagle	..	1807	40,000	50 - -					
Norwich Union	1808								
*Atlas	..	1808	24,000	50 - 10 -	1,200,000	132,000	22 10 -	540,000	13s. 6d. per share, and bonus.
*North British	..	1809	5,000	20 - -	1,000,000	100,000	35 - -	175,000	6 per cent.
Sun	..	1810	4,000	10 - -	400,000	40,000	65 - -	260,000	£1. 7s. per share.
Scottish Widows' Fund	1815								
European	..	1819	4,626	20 - -	92,520	92,520	20 - -	92,520	£1. per share.
General Benefit	..	1820			600,000	60,000	7 - -	84,000	£7. 10s. per cent.
British Commercial	..	1820	12,000	50 - -	750,000	75,000	19 10 -	146,250	12s. and bonus.
Imperial	..	1821	7,500	100 - -	2,000,000	900,000	61 5 -	1,225,000	5 per cent., and bonus.
*Guardian	..	1821	20,000	45 - -					
*National Insurance Co. of Ireland	..	1822	100	25 - -	1,000,000	100,000	..	..	6 per cent.
Economic.	..	1823	4,000	250 - -					

\* Original call, £10. Total capital paid up, £200,000; add profit, £700,000 = £900,000.

NAME OF COMPANY.	Date of Formation.		No. of Shares.	Amount of each Share.	Amount paid up on each.	Total Capital.	Total Capital paid up, supposing all the Shares to be issued.	Last Price, May, 1883.	Present Market Value of Shares.	Dividend.
	Mu- tual.	Pro- pri- etary.								
Edinburgh . . . . .	..	1823	5,000	£.	£. s. d.	£.	£.	£. s. d.	£.	6 per cent.
Law . . . . .	..	1823	10,000	100	15 - -	500,000	75,000	24 7 6	121,875	£1. 8s. per share.
Asylum . . . . .	..	1824	2,000	100	10 - -	1,000,000	100,000	50 - -	500,000	
*Alliance . . . . .	..	1824	50,000	100	30 - -	240,000	60,000	25 5 -	1,262,500	£7. 14s. 6d. per ct., & bonus.
Clerical, Medical, and General . . . . .	..	1824	5,000	100	addn. £1. 2 10 -	500,000	50,000	20 10 -	102,500	5 per cent., and bonus.
*Leeds and Yorkshire . . . . .	..	1824	10,000	100	addn. £7. 10s.	1,000,000	100,000	17 10 -	175,000	5 per cent., and bonus.
Palladium . . . . .	..	1824	30,000	50	2 - -	1,500,000	60,000	3 - -	90,000	
*Patriotic . . . . .	..	1824	15,000	100	and addn.	1,500,000	150,000	7 10 -	112,500	9s. per share.
*Scottish Union . . . . .	..	1824	250,000	20	1 - -	5,000,000	250,000	1 12 6	406,250	7½ per cent.
United Kent . . . . .	..	1824	10,000	50	2 10 -	500,000	50,000	20 - -	200,000	14s. per share.
*Yorkshire <sup>b</sup> . . . . .	..	1824	10,000	50	addn. £2. 10s.	1,000,000	30,000	17 5 -	103,500	14s. per share.
*Aberdeen . . . . .	..	1825	6,000	50	5 - -	300,000	40,000	3 5 -	65,000	7½ per cent.
Crown . . . . .	..	1825	20,000	50	2 - -	1,000,000	70,000	12 10 -	125,000	5 per cent.
Scottish Provincial . . . . .	..	1825	10,000	50	7 - -	500,000	30,000	7 5 -	43,500	5 per cent., and bonus.
Standard . . . . .	..	1825	6,000	100	5 - -	600,000				
University <sup>c</sup> . . . . .	..	1826	..	..	..	240,000				
Scottish Amicable . . . . .	..	1826	..	..	..					
Promoter . . . . .	..	1829	..	..	..					
Clergy Mutual . . . . .	..	1830	..	..	..					
National Life . . . . .	..	1830	..	..	..					
Aberdeen Mutual . . . . .	..	1831	..	..	..					
Scottish Equitable . . . . .	..	1831	..	..	..					
Friends' Provident . . . . .	..	1832	..	..	..					
Argus . . . . .	..	1833	3,000	100	4 - -	300,000	48,000	24 10 -	73,500	4 per cent.
Mutual (The) . . . . .	..	1834	5,000	100	addn. £12.	500,000	50,000	45 10 -	227,500	£2. 5s., and bonus.
Universal . . . . .	..	1834	50,000	20	2 - -	1,000,000	200,000	5 - -	250,000	4 per cent., and bonus.
United Kingdom . . . . .	..	1835	..	..	addn. £2.					
Metropolitan . . . . .	..	1835	5,000	100	4 - -	500,000	20,000	..	33,750	4½ ct., & bonus of 1½ ct. ½ an.
National Provident . . . . .	..	1835	30,000	5	1 - -	300,000	30,000	1 2 6		5 per cent.
Family Endowment . . . . .	..	1835	..	..	..	750,000				
*Monarch . . . . .	..	1836	20,000	50	2 - -	1,000,000	40,000	5 10 -	110,000	3s. per share.
*Nottinghamshire and Derbyshire . . . . .	..	1836	..	..	2 10 -	2,000,000		8 10 -		
Hand-in-Hand . . . . .	..	1836	..	..	..					
Legal and General . . . . .	..	1836	..	..	..					

<sup>a</sup> Limited and <sup>b</sup> London



NAME OF COMPANY.	Date of Formation.		No. of Shares.	Amount of each Share.	Amount paid up on each.	Total Capital.	Total Capital paid up, the Shares to be issued.	Last Price, May, 1863.	Present Market Value of Shares.	Dividend.
	Mu- tual.	Propri- etary.								
*Halifax, Bradford, & Keighley	..	1845	10,000	50	2 - -	500,000	20,000	2 - -	20,000	4 per cent.
*Legal and Commercial	..	1845	20,000	50	2 - -	1,000,000	40,000	2 - -	40,000	7½ per cent.
London and Provincial Law	..	1845	100,000	20	2 10 -	2,000,000	250,000	4 - -	400,000	5 per cent.
*Royal (Liverpool)	..	1845	50,000	10	2 10 -	500,000	125,000	2 15 -	137,500	
Sovereign	..	1845	50,000	10	..	500,000				
United Deposit	..	1845	50,000	10	..	500,000				
Brighton and Sussex	..	1846								
British Empire	..	1846								
Christian Mutual Provident	..	1846								
Medical, Legal, and General	..	1846								
National Friendly	..	1846								
Catholic Law and General	..	1846				200,000				
Colonial	..	1846	10,000	50	1 - -	500,000	10,000	3 2 6	31,250	4 per cent.
Consolidated	..	1846				50,000				5 per cent.
Defender *	..	1846	40,000	25	2 10 -	1,000,000	100,000	..	..	3 per cent.
India and London	..	1846	5,000	50	..	250,000				
Mitre	..	1846	6,000	25	2 - -	150,000	12,000	..	32,500	5 per cent.
Solicitors' and General	..	1846	20,000	50	1 5 -	1,000,000	25,000	1 12 6		4 per cent., and bonus.
English Widows' Fund	..	1847			..	200,000				
London & Provincial Joint Stock	..	1847			..	500,000	10,000	- 12 6	12,500	5 per cent.
Professional	..	1847	20,000	122.10s.	- 10 -	250,000				
Engineers', Masonic, & Universal	..	1848								
Indisputable	..	1848								
London Mutual Life & Guarantee	..	1848								
Gresham	..	1848	5,000	20	4 - -	100,000	20,000	5 - -	25,000	
Mentor	..	1848	5,000	50	2 10 -	250,000	12,500	2 10 -	12,500	
Metropolitan, Counties, & General	..	1848	10,000	10	2 10 -	100,000	25,000	3 - -	30,000	5 per cent.
Phoenix (Liverpool)	..	1848	20,000	5	..	100,000				
Prudential Mutual	..	1848	10,000	10	- 10 -	100,000	5,000	..	..	5 per cent.
Church of England Schoolma- sters & Schoolmistresses	..	1849								
County Mutual	..	1849								
Kent Mutual	..	1849								
Railway & General Mutual Pro- vident, Benevolent, & Life	..	1849								
United Mutual and General	..	1849								

Company name	Year	Capital	Reserve	Assets	Liabilities	Income	Expenses	Profit	Rate
East of England Mutual	1849	40,000	24,100	100,000	15,000	..	..	..	4 per cent.
Industrial and General	1849	20,000	50	1,000,000	..	..	..	..	5 per cent.
Railway Passengers <sup>a</sup>	1849	..	..	..	..	..	..	..	..
Times Life and Guarantee	1849	..	..	100,000	..	..	..	..	..
United Guarantee and Life	1849	..	..	100,000	..	..	..	..	..
*British Provident	1850	10,000	10	100,000	..	..	..	..	..
English and Cambrian <sup>b</sup>	1850	..	12,100	..	..	..	..	..	..
Law Property	1850	5,000	50	250,000	10,000	2	-	10,000	5 per cent.
National Guardian	1850	20,000	5	100,000	10,000	1	5	12,500	5 per cent.
New Equitable	1850	10,000	10	100,000	12,500	-	15	18,750	5 per cent.
Trafalgar	1850	25,000	10	250,000	..	..	..	..	..
Oak	1851	..	..	..	..	..	..	..	..
Age	1851	..	..	100,000	..	..	..	..	..
Athenium	1851	..	..	100,000	..	..	..	..	..
Deposit and General	1851	20,000	5	100,000	10,000	-	12	12,500	5 per cent.
*London and County	1851	..	..	100,000	..	..	..	..	..
London Monetary Advance	1851	6,000	5	30,000	..	..	..	..	..
New Protector (now British Protector Mutual)	1851	10,000	10	100,000	10,000	..	..	..	5 per cent.
National Provincial	1851	10,000	5	50,000	10,000	1	5	12,500	5 per cent.
Prince of Wales	1851	20,000	10	200,000	10,000	-	12	12,500	5 per cent.
United Service & General Life	1851	10,000	5	50,000	12,500	..	..	..	5 per cent.
Waterloo	1851	80,000	5	400,000	20,000	-	6	25,040	5 per cent.
Home and Foreign	1852	..	..	..	..	..	..	..	..
Marine Life and Casualty	1852	..	..	..	..	..	..	..	..
*Admant	1852	15,000	10	150,000	15,000	..	..	..	5 per cent.
*Beacon	1852	100,000	1	100,000	100,000	..	..	..	5 per cent.
Birkbeck	1852	20,000	5	100,000	20,000	..	..	..	5 per cent.
British Industry	1852	50,000	5	250,000	50,000	..	..	..	..
English & Irish Church & Univ.	1852	200,000	1	200,000	50,000	..	..	..	..
Era	1852	..	..	..	..	..	..	..	..
Hope Mutual	1852	250,000	1	100,000	125,000	-	10	125,000	5 per cent.
Householders	1852	100,000	20	250,000	200,000	2	17	287,500	..
*Lancashire	1852	10,000	10	100,000	10,500	..	..	..	..
Maritime Passengers <sup>c</sup>	1852	..	..	..	..	..	..	..	..
*Protestant	1852	..	..	..	..	..	..	..	..
*Sceptre of England <sup>d</sup>	1852	..	..	..	..	..	..	..	..
Wellington Revere <sup>e</sup> Ann <sup>f</sup> & Life	1852	5,000	10	50,000	..	..	..	..	..

<sup>a</sup> 14,000 shares issued. <sup>b</sup> About 3,900 shares issued. <sup>c</sup> Total share capital paid up (including voluntary payments), £13,240.  
<sup>d</sup> Instituted as a Proprietary Company for the purposes of arrangements with a French Fire Insurance Company; but the object not being found attainable, dissolved March, 1853.

*The Stamp Duties on Contracts of Assurance.*

THE recommendations made to and approved by the Select Committee of 1852 on Friendly Societies,\* with reference to the abolition or reduction of the duties payable in respect of policies for life assurance, have been acted upon more promptly than could well have been hoped for. The duties, it is true, have not been partly abolished in the way suggested, but the reduction now effected is so considerable as to make them fall very lightly upon those who will hereafter have to pay them. The effect of the late enactment will be seen from the following statement:—

*Stamp Duties on Policies of Assurance, whereby any insurance shall be made upon any life or lives, or upon any event or contingency relating to or depending upon any life or lives.*

Sum assured.		New duty.		
		£	s.	d.
Not exceeding £50 .....		0	0	6
Above £50, and not exceeding £100 .....		0	1	0
„ 100 .....	150 .....	0	1	6
„ 150 .....	200 .....	0	2	0
„ 200 .....	250 .....	0	2	6
„ 250 .....	300 .....	0	3	0
„ 300 .....	350 .....	0	3	6
„ 350 .....	400 .....	0	4	0
„ 400 .....	450 .....	0	4	6
„ 450 .....	500 .....	0	5	0
„ 500 .....	600 .....	0	6	0
„ 600 .....	700 .....	0	7	0
„ 700 .....	800 .....	0	8	0
„ 800 .....	900 .....	0	9	0
„ 900 .....	1,000 .....	0	10	0
„ 1,000 .....	2,000 .....	1	0	0
„ 2,000 .....	3,000 .....	1	10	0
„ 3,000 .....	4,000 .....	2	0	0

and so on; a further duty of 10s. being payable in respect of every additional £1,000, or fractional part of £1,000.

Contrasted with the duties hitherto payable, these are light enough; so much so, indeed, that we believe most of the Offices will not think it worth while to make any demand from the assured on account of them; particularly as they will be more than recompensed by the reduction effected in the ordinary receipt stamp; and thus, except so far as any abstraction from the funds of Companies

\* *Vide* Report of the Committee, p. 4; and Evidence, pp. 66, 67, 70, 71.

not wholly proprietary is more or less one from the assured, these latter will be relieved from payment of this tax altogether.

These advantages are to be received thankfully; nevertheless, we cannot help wishing that the recommendation above alluded to, and which advocated the abolishing all stamps for sums under £500, had been also acceded to. The revenue to be derived from the new duties must be quite insignificant; whilst the inconvenience to all parties, arising from the necessity to provide such a variety of stamps, will be considerable. It is however to be hoped, that the present reduction is a step to the final abolition of these troublesome and, we should imagine, all but unproductive sources of income to the Government.

The objections so justly made to heavy stamp charges on marine and life policies, which fortunately are now partially removed, apply with equal force to the onerous tax at present levied on fire insurances. It may be considered a happy augury, that all our recent commercial legislation points to a reduction of this heavy and obstructive impost. A duty of 3s. per cent., at a time when competition has reduced the premium for the best class of risks to 1s. 6d. per cent., appears obviously, at the first glance, to be what it really is, a violation of all the sound principles lately acted upon in our fiscal policy. This first impression loses nothing of its force by a detailed examination.

In the first place, the fire insurance duty is eminently partial; it touches only the prudent and careful portion of the community. The practice of insurance, in all its various branches, has one quality in common. To insure, is to make a present certain sacrifice to avoid a future but contingent loss. The man of forethought looks forward and calculates probabilities; the careless man leaves to chance risks which might be covered, but which may prove his utter ruin. It cannot surely require lengthened statements to show, that it is neither a wise nor moral social arrangement to lay a burden upon the provident which the careless and short-sighted altogether avoid.

This primary objection, which applies to every tax of the kind, however small, becomes strikingly apparent in the case in question, by the disproportion of the duty levied to the actual charge for premium required to cover the risk. In cases of common hazard, the duty is double the premium. To insure £1,000 on a private house, the charge for premium is 15s.; the duty levied, and paid at the same time, is 30s.: so that a man impelled by motives of prudence to relieve himself from a contingent risk, which highly

responsible parties are willing to cover for 1s. 6d., is called upon to pay 3s. to the revenue, in order to give validity to the transaction.

As it is quite understood that there is no task more difficult than to find a tax altogether free from some grave objections, it is not intended at present to advocate the entire repeal of the duty, but rather to point out in what manner a considerable reduction—say, to 1s. per cent.—would benefit all the parties interested in the question. The assured, the Offices, the revenue, would have equal reason for congratulation on the common benefit derived from the proposed reduction.

The assured class embraces all ranks and degrees of fortune to be found in our community. A prudent artisan presents himself to insure the modest furniture of his house or apartments for £100. The Office is quite ready to accept 3s. per annum for premium, but this charge is immediately doubled by the duty.

It will be observed that the premium in the case of small amounts is higher than for larger sums; but it is to be borne in mind that the expense and trouble to the Office for small insurances bear a much larger ratio to the premium than for larger sums. The same printed receipts, entries, postages, notices for renewal, indorsements, are necessary; but no one who knows the course of business can doubt that a reduction of duty would bring such an increased number of policies of this class, that a considerable reduction of premium might be confidently expected to follow. The case of the honest and hard-working classes, as to insurance, is often made painfully apparent. Whenever a fire happens in a crowded neighbourhood, the most indubitable evidence is always furnished of the general neglect by the labouring classes of this act of prudent precaution. To such an extent, indeed, does this happen, that appeals to the public sympathy for pecuniary relief are quite a common appendage to the public notice of the calamity.

The middle and mercantile classes find also in the high duty reasons either for altogether neglecting insuring, or reducing the amount of their policies to an imprudently low level. The tax becomes, in proportion to other rates, really a serious item of charge—a per centage upon the rental of houses, equal to the property tax. The tenant of a house of £50 per annum, holding on lease, probably insures for £500 on the building and £500 on the contents. The duty is 30s., or a little beyond the amount of the property tax chargeable for the house.

The higher grades of the mercantile community equally find an onerous burden in the insurance duty. A wholesale dealer, at a



rent of £200 a year, will probably have £10,000 worth of stock. The duty of £15 a year makes a permanent tax of 1s. 6d. in the pound, in addition to his rent. The importing merchant, no less than the smaller dealers, feels the effect of duty on his general charges. For example: the warehouse rent he would have to pay, in first class warehouses, for £10,000 worth of raw silk, may be stated to be for six months £16. 5s. The insurance duty adds directly £7. 10s. to the charge for warehouse rent.

When it is considered that these heavy duty charges are voluntarily paid by the prudent classes with a view only to provide against a future and altogether uncertain calamity, it can excite no surprise whatever when we learn that but a small proportion of the whole property of the country is at this moment insured. The extent to which the business of the Insurance Companies is obstructed can scarcely be estimated. Large properties and estates are frequently left wholly uninsured; the owners, who would willingly pay the moderate premium required, revolting altogether at the 200 per cent. addition of duty. Large bulks of merchandise are kept uncovered for the same reason. But a still greater drawback for the Companies is, that among their own insurers the amounts are so cut down and reduced to meet the duty charge, that the sums insured bear no fair ratio or proportion to the value of the property covered. The great majority of claims are made for partial losses, or for sums short of the sum covered; and, not being settled upon the *pro rata* or average principle, the adverse operation of this general system of under-insurance upon the interests of the Companies does not stand in need of further explanation. An under-insurance of any risk is, as far as their interests are concerned, a virtual reduction of the rate of premium paid.

The question of the Finance Minister, to whom the difficulties of the assured are of little weight, and the complaints of the Companies still less, will probably be—what prospect is there of the tax recovering a reduction of the extent proposed? The grounds for such an expectation have been already stated. A large proportion of the insurable property of the country is left wholly uninsured; and of that which is nominally covered, only a small per centage is actually insured.

Only the most general statements can be made as to the facts. A short time since, an account was taken in London, for one whole year, of the proportion of insured to uninsured properties that were destroyed or damaged by fire in that year. The following were the results:—

						Properties.
Insured—Buildings .. .. .	..	..	..	..	..	914
„ Contents .. .. .	..	..	..	..	..	609
						1,523
Not insured—Buildings .. .. .	..	..	..	..	..	197
„ Contents .. .. .	..	..	..	..	..	404
						601
Unknown .. .. .	..	..	..	..	..	12
Total .. .. .						2,136

So that in London, which is known to be the very centre of the insurance business, we find not less than four tenths of all the moveable property wholly uncovered; and in reference to both that class of property and the buildings, it is probably no exaggeration to state, that in the cases where they were insured they were not covered for 50 per cent. of their insurable value.

Estimates have been made, taken from the valuation for the police rate and other general assessments, showing satisfactorily that not one half of the value of the property in the metropolis and suburbs is insured; and it is an undisputed fact, that in no part of the country is the habit of insurance so general as in those districts.

It is quite sufficient to take a glance at the gross amount of the duty paid, and observe the little progress that it makes, to be quite satisfied that the excessive duty is doing a fatal work. Take, for example, the last five years. The returns distinguish the sums paid by the London Companies from those paid by the provincial.

	1847.	1848.	1849.	1850.	1851.
London Offices ..	738,021	740,794	755,055	782,003	800,740
Country Offices ..	346,435	339,494	344,106	347,589	354,863
	1,084,456	1,080,288	1,099,161	1,129,592	1,155,603]

Now let anyone reflect upon the progress that has been made during those five years in the creation of insurable property—the houses that have been built and furnished—the mills, manufactories, and machinery that have been erected—the enormous stocks in the hands of our importing and general dealers and merchants—and he will have, without further statements, a tolerably clear idea of the depressing and impeding effect of this most burdensome and mischievous impost.

Many interesting facts might be added, bearing on the same point; but enough has been already said to call public attention to the subject, and also to justify the confident expectation expressed, that it would require but a short time to make up the loss to the revenue occasioned by the proposed reduction.

*On the Calculation of Tables of Mortality.* By M. A. QUETELET, *Membre de l'Académie Royale de Belgique.* (Translated from the original paper, printed by the Académie Royale de Belgique in t. xix., No. 10, *Des Bulletins.*)

IN order perfectly to obtain its object, a table of mortality must exhibit the *actual* mortality at the different ages; and to be of any practical use, we should be able from the results of the past to predict events for the future.

The actual mortality can only be directly determined by knowing the population, as well as the number of deaths, which occur at each age. There are, however, very few countries in Europe in which these two elements are sufficiently ascertained. Even in Belgium, the division of the population by ages was but imperfectly known till the census of 1846, the results of which were only published about the end of 1848.\* It was therefore necessary, in order to form the tables of mortality, to pass over the important element of the existing population, and frame them from the registers of deaths. In this manner, the tables of mortality which I have given successively since 1827 have been constructed on the hypothesis of a stationary population.

It is an error, as I have shown in a former paper (Nov. 8, 1851; see t. xviii. *Des Bulletins*, 2<sup>e</sup> partie, p. 360), to suppose that a table of mortality, computed on the hypothesis of a stationary population, must change to any great extent when the population becomes increasing or decreasing; or, on the other hand, that it remains identically the same whilst the population is stationary. These kinds of questions are extremely difficult, and by their apparent simplicity often lead into error persons unaccustomed to such calculations, as I have observed in another work,† in which I have endeavoured to treat the problem of tables of mortality in its fullest extent.

The interest which attaches to this important subject, and in general to all questions relative to assurances on lives, has induced me to present a summary of the principal results at which I have arrived, in calculating a table of mortality based upon the census of

\* In the census of 1829—which, however, was made with greater exactness than is generally believed—the division of the population by ages was not sufficiently attended to. According to the different periods of life, the population was grouped in totals of five, three, or two years. This subdivision did not allow of supplying with sufficient accuracy the interpolations to correct the errors as to declaration of age which usually occur at the ages expressed in round numbers, such as 30, 40, &c.

† *Le Mémoire sur les Tables de Mortalité*, which will appear in the fifth volume of the *Bulletins de la Commission Centrale de Statistique du Royaume.*

1846, and on the registers of deaths during the decennial period 1841 to 1850.

I commence by giving the general formulæ by which the calculations have been made:—

Let  $N_0$  = the number of births in a year.

$N_1$         „        of children 1 year of age.

$N_2$         „        „        2 years of age.

$N_3$         „        „        3        „

.....

$N_n$         „        of individuals  $n$  years of age.

Let further—

$d_0$  = the number of deaths from 0 to 1 year of age.

$d_1$         „        „        1 „ 2 years of age.

$d_2$         „        „        2 „ 3        „

.....

$d_n$         „        „         $n$  to  $n+1$  years of age.

The numbers  $N_0, d_0, d_1, d_2$ , &c., will be given by the registers, and the numbers  $N_1, N_2, N_3$ , &c., will be ascertained by the census. This admitted, the mortality of each class will be respectively—

$$\frac{d_0}{N_0} \quad . \quad . \quad . \quad . \quad . \quad 0 \text{ to } 1 \text{ year.}$$

$$\frac{d_1}{N_1} \quad . \quad . \quad . \quad . \quad . \quad 1 \text{ „ } 2 \text{ years.}$$

$$\frac{d_2}{N_2} \quad . \quad . \quad . \quad . \quad . \quad 2 \text{ „ } 3 \text{ „}$$

$$.....$$

$$\frac{d_n}{N_n} \quad . \quad . \quad . \quad . \quad . \quad n \text{ „ } n+1 \text{ years.}$$

Now, if we know the mortality at each age, it will be easy to calculate from year to year the number remaining of the individuals,  $N_0$ , born at the same time, supposing it to be admitted that the mortality continues at the same rate: we will call  $N_1, N_2, N_3$ , the values of  $N_0$ , after 1, 2, 3, &c. &c. years, and we shall have

$$N_0 - N_1 = d_0 \quad \text{after the 1st year, whence } N_1 = N_0 - d_0$$

$$N_1 - N_2 = N_1 \frac{d_1}{N_1} \quad \text{„} \quad 2\text{nd} \quad \text{„} \quad \text{„} \quad N_2 = \frac{N_1}{N_1} (N_1 - d_1)$$

$$N_2 - N_3 = N_2 \frac{d_2}{N_2} \quad \text{„} \quad 3\text{rd} \quad \text{„} \quad \text{„} \quad N_3 = \frac{N_2}{N_2} (N_2 - d_2)$$

.....

.....

$$N_n - N_{n+1} = N_n \frac{d_n}{N_n} \quad \text{„} \quad n+1 \quad \text{„} \quad \text{„} \quad N_{n+1} = \frac{N_n}{N_n} (N_n - d_n)$$

But the number of births,  $N_0$ , must correspond with the successive deaths which will occur every year till all are extinct; and these annual deaths,  $N_0 - N_1$ ,  $N_1 - N_2$ ,  $N_2 - N_3$ , &c., will be given by the preceding equations: we shall have then

$$N_0 = d_0 + \frac{N_1}{N_1} d_1 + \frac{N_2}{N_2} d_2 + \frac{N_3}{N_3} d_3 + \&c.$$

In the particular case in which

$$\frac{N_1}{N_0} = r^1, \quad \frac{N_2}{N_1} = r^2, \quad \frac{N_3}{N_2} = r^3, \quad \&c.,$$

the population is increasing or decreasing in geometrical progression, and their results

$$N_0 = d_0 + r^1 d_1 + r^2 d_2 + r^3 d_3, \quad \&c.$$

When

$$\frac{N_1}{N_0} = \frac{N_2}{N_1} = \frac{N_3}{N_2} = \&c. = 1,$$

the population is stationary, and we obtain

$$N_0 = d_0 + d_1 + d_2 + d_3 + \&c.$$

This last hypothesis constitutes that which it has been agreed to call the *method of Halley*; the former, more particularly examined by Euler, has been applied but little in practice. It rarely happens, in fact, as it has been remarked by Moser,\* that a population continues uniformly increasing or decreasing during a whole century.

The following comparison comprises three tables of mortality; one calculated directly by the general formula, from the combined data of the census of 1846 and of the registers of deaths from 1841 to 1850; a second, which I computed in 1850, on the hypothesis of a stationary population; and a third (for which I am indebted to M. Liagre), calculated on the hypothesis of a population increasing geometrically in the ratio of 1.0062, and according to the deaths from 1841 to 1850. (See p. 30.)

We see that the table computed on the hypothesis of a stationary population gives for infancy a rate of mortality much more rapid than the other two tables. The correspondence of the two last, for the different ages, seems to prove that the population has been steadily increasing in geometrical progression since the beginning of the century.

In other respects the three tables correspond very closely after

\* *Die Gesetze der Lebensdauer.* Berlin, 1839. 1 vol. 8vo.

20 years of age, as may be better seen by assuming unity as the number surviving to age 50, as has been done by Demonferrand in France, and by Galloway in England.

TABLE OF MORTALITY,  
*Calculated on the Hypothesis of a Population.*

Ages.	By General Formula.	Stationary.	Increasing in Geometrical Progression.
At Birth	10,000	10,000	1,000
1 year	8,497	7,945	850
2 "	7,882	7,123	790
5 "	7,253	6,284	725
10 "	6,886	5,822	685
15 "	6,626	5,555	660
20 "	6,350	5,225	631
25 "	6,086	4,846	595
30 "	5,730	4,539	564
35 "	5,427	4,240	534
40 "	5,110	3,932	501
45 "	4,759	3,592	464
50 "	4,401	3,288	425
55 "	3,968	2,972	383
60 "	3,454	2,616	340
65 "	3,837	2,162	283
70 "	2,161	1,653	218
75 "	1,394	1,098	147
80 "	750	599	82
85 "	312	242	34
90 "	92	68	11
95 "	18	13	3
100 "	2	1	2

TABLE OF MORTALITY,  
*Computed on the Hypothesis of a Population.*

Ages.	By General Formula.	Stationary.	Increasing.
At Birth	2,267	3,042	2,353
10 years	1,559	1,765	1,612
20 "	1,441	1,589	1,485
30 "	1,300	1,580	1,327
40 "	1,159	1,196	1,179
50 "	1,000	1,000	1,000
60 "	787	796	800
70 "	498	503	513
80 "	175	182	193
90 "	22	21	47

At ages after 50, the two former tables agree better together than with the third, which gives the numbers a little too great; from whence it would appear to result that, previous to the present century, the population was rather stationary than increasing.

S. B.

*The Report from the Select Committee on Assurance  
Associations.*

**ALTHOUGH** this document has already appeared in several publications devoted to the discussion of life assurance matters, we think our readers will consider, with us, that the importance of it justifies its republication in the pages of this Journal.

To the Institute of Actuaries it cannot but be gratifying to observe that the recommendations made by the Committee tally as nearly as possible with the resolutions, so far as they go, adopted at the Special General Meetings held on the 12th and 19th April, in the present year. Thus the first resolution was to the effect that the Act of 1844 has created an invidious distinction between the Offices established prior to 1844 and those established since, and that the Act in question ought to be forthwith repealed, and provision made for putting all existing Offices on an equal footing. In article V. the Report states—

“The Committee have arrived at the conclusion that in many ways that distinction (the distinction between the Offices established prior to the Act of 1844 and those completely registered under it) has operated prejudicially, and that it would be eminently to the advantage of the Offices themselves, as well as to the public at large, if all Insurance Companies could be brought under one law, leaving each Company to recommend itself to the public upon its own merits;”

And again, in the 3rd section of Article XII., the Committee say that they

“are of opinion that it would be highly advantageous to all parties if all Companies, both those existing and those that may in future be formed, could be placed under one general system of registration.”

The second resolution of the Institute, it will be remembered, deprecated any undue restrictions, but advocated the requiring from every new Company a deposit with the Government of at least £10,000, as some guarantee to the public of its ability to fulfil its engagements. The Select Committee feel it to be

“very important that no check or impediment should be placed in the way of the further extension of these enterprises. . . . On the other hand, they consider it desirable to interpose such checks as will give a reasonable guarantee as to the *bond fide* intentions of the promoters of such Companies; and with this view, they are of opinion that no new Company should be admitted to complete registration until a capital shall have been subscribed and actually paid up of at least £10,000, and which shall be invested in the public funds under such regulations as Parliament may deem fit to enact.”

The third and last resolution of the Institute, it will be recol-

lected, expressed an opinion that no legislation on Life Assurance Associations could be permanently effective that did not exact tests as to the respectability and acquirements of persons allowed to practise as actuaries. On this head the Committee say, they

“will conclude their Report by calling attention to a part of the evidence which advocates the formation of an Incorporated Society of Actuaries, with a view to the advancement of that (*query*, their) important science, and also with a view to issue diplomas or certificates to persons qualified to practise as actuaries. If any effort should be made to induce Parliament to grant such an incorporation, the Committee are of opinion that it will be worthy of consideration ; but that further investigation would be needful before such measures should be adopted, *as considerable difference of opinion prevails on the subject among actuaries themselves.*” \*

As this difference of opinion does not exist in the Institute (for the members of that body will no doubt recollect that the resolution on this head was carried at a large meeting without a dissentient voice), the views of the Committee, thus far, may be said actually to coincide with those put forward at the meetings referred to ; and it is not a little remarkable, that, as regards the more difficult question of the publication of accounts, there is reason to believe that the same correspondence existed : for it will no doubt be borne in mind, that the following resolution, which contains the essential portion of section 5 of the twelfth article of the Report, was only not brought forward in consequence of the length of time to which the proceedings of the meeting had already extended ; viz :—

“That the provisions of the Act 7 and 8 Victoria, cap. 110, with reference to the production and registration of the accounts of Companies established under it, have not worked satisfactorily ; that the object sought by them would be more likely to be obtained, were all Companies, without exception, required instead to register at intervals (upon every valuation and division) a classified statement of the assurance contracts then in force on their books, and a general abstract of the funds in hand.”

These striking coincidences are gratifying. They serve, on the one hand, to show that the views taken by the two authorities, on these several points at least, are sound and judicious ; and, on the other, to demonstrate the competency and usefulness of the Institute as a tribunal for the consideration of the like important questions. So long as the efforts of that body for the advancement of the profession and its science are characterized by the same wisdom

\* We shall take an early opportunity to draw the attention of our readers to the evidence which has given rise to this remark, and to examine dispassionately the views and objects of the persons giving it. The opposition to such a measure, of members of the profession, would appear to most persons, having its real interests at heart, to be nothing other than suicidal. The object of opponents, out of it, we can perfectly well understand.



and forethought, it can well afford to disregard, although it must lament, the obstacles which indifference and prejudice continue to throw in its way.

The Report of the Committee is as follows:

"The Select Committee appointed to take into consideration the subject of Assurance Associations, and who were empowered to report their observations, and the Minutes of Evidence taken before them, to the House, have considered the matters to them referred, and have agreed to the following report:—

"I. Your Committee have considered the subject referred to them, and have examined the Registrar and Assistant-Registrar of Joint Stock Companies; the Registrar of Friendly Societies; Mr. Finlaison, the late Actuary to the Commissioners of the National Debt; Dr. Farr, at the head of the Statistical Department of the Registrar-General's Office; and many of the most eminent Actuaries, connected with Insurance Offices of every class.

"II. So far as regards the Joint Stock Companies' Act of 1844, your Committee have confined their inquiry chiefly to that portion of it which affects Insurance Companies, and more particularly the business of life insurances. From the evidence of the Registrar and Assistant-Registrar of Joint Stock Companies, it appears that the law, as it now stands, is extremely defective, and that the provisions of the Act of 1844 are very imperfectly carried out; many of which they have no power to enforce if not complied with.

"III. With regard to provisional registration, it appears that the law, as it now stands, does not afford the security which was contemplated by the Act of 1844, inasmuch as the representations made by the prospectuses and advertisements issued by new Companies often vary very materially from the objects for which they have been provisionally registered, and there appears to be no means at present to prevent deception and misrepresentation being practised on the public in this way. Nor are the regulations required in order to obtain complete registration more perfect for that purpose. It is required by the law that the deed of settlement should be signed by shareholders equal to one fourth in number, and representing one fourth of the proposed capital of such Companies; but it appears from the evidence of Mr. Whitmarsh that this provision has been extensively abused by means of false and fraudulent signatures, and has thus proved to be a very insufficient security for the objects contemplated. It appears also, that it has been frequently evaded by Companies commencing business with a very small capital, and, immediately upon obtaining complete registration, greatly increasing its amount, which they are enabled to do without further recourse to the office of the Registrar. These observations, however, apply to Joint Stock Companies generally.

"IV. After Joint Stock Companies are completely registered, one of the chief securities contemplated by the Act of 1844 for the safety of the public is the duty imposed upon them to return annual balance-sheets, representing the state of their affairs, to the Registrar's office, where they are open to public inspection; but from the fact that that Act prescribed no form, and furnished the Registrar with no power to enforce a compliance with the spirit or even with the letter of the law, it appears that this provision has been very imperfectly complied with in many cases, and in others altogether neglected; so that it cannot be said that it has afforded, in a majority of cases, either the

information or the security which was intended. Much doubt, indeed, has been expressed by some witnesses, whether the publication of accounts in their present form has not rather tended to mislead than to inform the public, in which view your Committee are inclined to acquiesce; and if the system of publishing accounts is in future to be persevered in, your Committee express a decided opinion that the law must define more clearly what it requires, and that a greater power should be given to enforce whatever provisions are thought necessary for the purpose.

“ V. There is one subject, which has formed so prominent a feature during your Committee’s inquiry, and which has partly arisen from the Act of 1844, that they cannot pass it over without some remark—viz., the differences of opinions and views entertained by the two great classes of Offices, the one including those established since the passing of the Act of 1844, and completely registered under that Act, and the other those established prior to that date, and not so registered. Your Committee have arrived at the conclusion that in many ways that distinction has operated prejudicially, and that it would be eminently to the advantage of the Offices themselves, as well as to the public at large, if all Insurance Companies could be brought under one law, leaving each Company to recommend itself to the public upon its own merits.

“ VI. With regard to the general condition of existing Companies, so far as any evidence has been laid before your Committee, they feel it their duty to report, that it is more satisfactory than they had been led to believe before they entered upon their inquiry. No doubt instances of great abuses and flagrant frauds have been disclosed by the witnesses examined; but in general these consisted of an open violation of all law, more akin to swindling than to regular trade, and such as it would be difficult for any legislature to prevent, so long as private persons exercised so little precaution in the conduct of their own affairs. But while the Committee are enabled to speak in these satisfactory terms of existing Offices, so far as the evidence has gone, their attention has been called to the great facilities which exist under the present state of the law for Insurance Companies, in common with others, being brought into existence with no reasonable prospect of, or guarantee for success, and not unfrequently without any *bonâ fide* intention of transacting business. It appears by a return made to your Committee from the office of the Registrar, that since the passing of the Act in 1844, no fewer than 311 Insurance Companies of various kinds have been provisionally registered, of which only 140 were completely registered, and of which only 96 continue to exist at this time; and while your Committee have reason to believe that some of the Companies which have ceased to exist during that period, have been absorbed in other Companies by whom their business has been taken over, yet at the same time they have no doubt that considerable traffic has been carried on in the mere creation of Companies which never had any real prospect of a *bonâ fide* existence.

“ VII. So far, then, as regards the present state of the law as established by the Act of 1844, it appears to be a very general, if not a universal opinion, that it requires some amendment; and in which your Committee fully concur. They are deeply impressed with the opinion, that as the law now stands it does either too much or too little—too much, inasmuch as any legislative enactments professing to protect the public in such matters have a certain tendency to weaken and impair that individual vigilance which would be more

surely exercised if no such attempt was made ; and too little, inasmuch as the securities which the law provides are ill calculated to effect the object at which they aim. On the part of all the witnesses examined, your Committee found a laudable desire to improve the existing state of the law, differing, no doubt, widely in their views as to the best mode of accomplishing that object. On the part of the old Offices of extensive business, the witnesses who more particularly represented them, expressed their desire to be placed under one general rule ; to make such annual returns, and to afford such other tests, as could be given without an undue interference with their business, for the purpose of securing one safe and uniform system, by which a reasonable security may be afforded for the respectability and solvency of Insurance Companies.

“VIII. In approaching the question of what alterations in the present state of the law your Committee are prepared to recommend, they feel that it is one which is surrounded by great difficulties. The two distinct principles in respect to subjects of this nature—viz., that of interference by the Government for the protection of the public, and that of no interference whatever—have been very fully and ably discussed by the witnesses examined by your Committee. On the one hand, even admitting the general wisdom of the principle of non-interference on the part of the Government in matters of trade, it has been contended that the question of life insurance differs so materially in its general character from ordinary trading transactions, that it may fairly be considered as an exception to that rule. This exceptional treatment has been justified and supported, on the ground that the obligations undertaken by such Associations have reference to a very remote and uncertain period ; that the object which persons have in view in effecting insurances upon their lives, is generally of an important and solemn character, viz., the provision for widows and orphans after the death of their natural protectors ; that, unlike any ordinary transaction of trade, a contract once entered into cannot be discharged or abandoned, if doubts of the stability of an Office should arise, without a great sacrifice of premiums paid in past years, and the necessity of effecting new policies in other Offices at increased rates of premium, owing to the greater age of the assured ; and that, in the present state of uncertainty which arises from the imperfect knowledge as to the real condition of Assurance Offices, persons are thus placed in the anxious and unhappy dilemma of being compelled to persevere in paying premiums from year to year, with some suspicion and doubt as to the ultimate advantage of doing so, or of incurring the serious loss which under the most favourable circumstances must attend the abandonment or sale of a policy. On these considerations, as a special case, it has been contended by different witnesses of great experience, that interference on the part of the Government is not only justifiable, but a matter of high duty, for the protection and information of the public.

“IX. On the other hand, it has been contended with equal ability, that insurance business forms no exception to ordinary trade in these respects ; that the Acts which have already been passed with a view of controlling the operations of Insurance Societies have been rather hurtful than beneficial for the very objects they had in view ; that an apparent compliance with the provisions of an Act of Parliament, and a certificate of complete registration, while they have proved entirely ineffectual for their professed objects, and no real security to the public, have afforded facilities, under the sanction of parliamentary authority, embodied in regulations administered by a public department, for the

formation of Companies and the perpetration of frauds which could not otherwise have been accomplished. And it has been further contended that it is impossible to make such regulations, consistent with the free development of private enterprise, which, so far as the public is concerned, will not prove more prejudicial by lulling private prudence and vigilance, than beneficial in respect to any increased security which they can confer.

"X. Much difference of opinion has been expressed by the different witnesses favourable to the former of the two principles alluded to, as to the extent to which Government interference should take place. Some have contended, not only for an enactment which should more strictly regulate the circumstances under which Insurance Companies can be formed, but also for the appointment of Government Actuaries, under a department of the State, who should have a direct supervision of the proceedings of all Insurance Companies, while the generality of witnesses favourable to some regulations have confined themselves to much narrower limits, and have contended only for such precautions as should test the *bona fides* of new Companies, and as should from time to time afford a fair amount of information with respect to the condition of such Companies, relying upon the good faith of directors and actuaries for the accuracy of the information furnished.

"XI. In venturing to express the views which your Committee have been led to entertain as to the course which Parliament should pursue in future in regard to the subject of life assurances, they will divide their remarks into five heads:—

"1. As to the mode in which it is desirable to deal with the present Joint Stock Companies' Act, so far as relates to Insurance Companies.

"2. As to the Registrar's office, duties, and powers.

"3. As to the registration of existing Offices.

"4. As to precautions which it seems desirable to take in order to test the *bona fides* of new Associations, and to entitle them to complete registration.

"5. As to the securities which can be afforded to the public by the publication of periodical accounts.

"XII. Your Committee will now proceed to remark on each of these points separately.

"1st. Your Committee are of opinion that the business of Assurance Companies differs so much from ordinary business, that it will be advisable to repeal all the provisions of the Joint Stock Companies' Act so far as they relate to Assurance Societies, and to deal with them in a separate Act.

"2nd. Your Committee have already adverted to the insufficient power which the existing Act confers upon the Registrar of Joint Stock Companies to give effect to the provisions of the law. Your Committee are of opinion, that whatever duties may be entrusted to that officer under any Act to be passed, it is essential that adequate powers should be provided to enable him, either by himself or through one of the departments of the State, to enforce any regulations that Parliament may think it wise to enact. Experience has proved that, without such powers, regulations become a dead letter, and are only calculated to mislead, by the apparent sanction which they give to proceedings not in reality controlled by them.

"3rd. Your Committee, in a former part of this Report, have alluded to the inconvenience which has arisen from the fact that a portion of the existing Assurance Offices are completely registered under the Act of 1844, and a

portion not so registered. The effect of this distinction has been to lead to controversies between the 'old Offices' (established prior to 1844) and the 'new Offices' (established since the passing of the Act of that year) which have been prejudicial to the interests of the public. Your Committee are therefore of opinion that it would be highly advantageous to all parties, if all Companies, both those existing and those that may in future be formed, could be placed under one general system of registration. In accomplishing this, your Committee would recommend that the requirements for registration, as regards existing Companies, should be as simple as possible, but that whatever periodical returns may be deemed necessary, should be the same as regards all Companies whatever.

"With regard to mutual Assurance Companies, where the claims of the assured are confined to the funds of the Society, and where no personal liability attaches, your Committee are of opinion that the requirement of the law that the members of such Societies should be registered is of no real utility to the public or the assured, while it is both expensive and troublesome; and that all the objects of the law would be answered by a registration of the directors and other officers of such Societies.

"4th. Your Committee feel that perhaps the most important part of their inquiry is that which refers to the precautions which should be hereafter adopted with regard to the formation of new Companies. On the one hand, your Committee feel that the ground hitherto occupied by these useful institutions has been comparatively limited, and that their application is capable of a great extension, not only in the higher and middle classes of society, but also among the humbler classes, to whom it has recently been very considerably applied; and that it is therefore very important that no check or impediment should be placed in the way of the further extension of this enterprise, not absolutely needful for the security of the public. On the other hand, the Committee are of opinion, that in the interest of the Companies themselves, as well as in that of the public, it is desirable to interpose such checks as will give a reasonable guarantee as to the *bonâ fide* intentions of the promoters of such Companies. To this extent only the Committee are of opinion that any interference, at this stage, is desirable. With this view, in addition to such regulations as may be considered needful for the purposes of registration, the Committee are of opinion that no new Company should be admitted to complete registration until a capital shall have been subscribed and actually paid up of at least 10,000*l.*, and which shall be invested in the public funds, under such regulations as Parliament may deem fit to enact; to be considered in the double light of a test of *bonâ fide* intentions on the part of the promoters, and of a security for the liabilities of the Company at its early stage of existence.

"5th. No part of the subject submitted to your Committee has received more attention than that of the publication of periodical accounts. Hitherto those accounts, as published, have been of a most unsatisfactory character. Your Committee have carefully considered whether it would be practicable to prescribe such a form of account as would accomplish the objects of the legislature; but after the most careful consideration, they are led to the conclusion that no fixed form could be made applicable to all cases, which would not be exposed to much evasion, or which would practically afford any real security.

"Your Committee therefore would recommend that it shall be imperative upon each Company to make a complete investigation into its affairs at least

once in five years, as is usually prescribed by their deeds of settlement, and at such times so prescribed, which shall show a complete valuation of their risks and liabilities, and of their assets to meet the same; and that all such valuation accounts, which may be made for the information and use of their proprietors, shareholders, or members, shall be registered in the office of the Registrar; and that in each intermediate year between such periodical balance-sheets or valuations, there shall also be registered a statement containing authenticated information on the following particulars:—

“The amount of receipts during the year for premiums on policies; the amount of expenses during the year; the number and amount of new policies issued; the total number and amount of liabilities on all current policies; the total amount of premiums receivable on the same; the whole amount of capital, distinguishing the manner in which invested; how much in cash; how much in Government securities; how much in mortgage upon real estate; how much in other securities, specifying their nature; the average rate of interest received upon each class of investments; the amount of such investment, if any, on which the payment of interest is in arrears; the table of mortality and the rate of interest used in calculating the premiums.

“XIII. The evidence which your Committee has obtained, leads them to believe that some such general statement would be of much greater utility in enabling the public to come to a correct judgment as to the condition of an Office, than any form of account that could be adopted. In addition to the above, in the case of proprietary Companies, the amount of subscribed capital should be stated, and also the amount actually paid up, and how invested.

“XIV. It has been brought to the attention of your Committee, that the business of Assurance Offices is becoming every year of a more varied character.

“XV. This your Committee regard as the necessary result of the advancement of the science on which it is based; but there is a class of business which some Offices have undertaken, viz., that of receiving deposits of money at interest, which appears to your Committee totally inconsistent with the business of life assurance.

“XVI. Your Committee will conclude their Report by calling attention to a part of the evidence which advocates the formation of an incorporated Society of Actuaries, with a view to the advancement of that important science, and also with a view to issue diplomas or certificates to persons qualified to practise as actuaries. If any effort should be made to induce Parliament to grant such an incorporation, the Committee are of opinion that it will be worthy of consideration; but that further investigation would be needful before such measures should be adopted, as considerable difference of opinion prevails on the subject among actuaries themselves.”

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*On the Rate of Mortality amongst Europeans and their Descendants residing in the Island of Jamaica.*  
*By J. MARSHALL, Esq., Actuary of the Jamaica Mutual Life Assurance Company.*

TABLE showing the Mean Probabilities of Human Life, with the values of the Annuities and Reversions, &c., as deduced therefrom.

Age.	YEARLY PROBABILITIES.			LOGARITHMS.			Value of Life Annuity.		Single Premium for Assured £100 at death.		Annual Premium, whole term of Life.		Single Premium for Assured £100 at death.		Annual Premium, whole term of Life.		Single Premium for Assured £100 at death.		The age the Life will attain, on the average expectation.		Also the fractional portion (further of the ensuing year.	
	Average Expectation of Life.	Of Surviving each year.	Of the Life failing during the same; or Law of mortality yearly.	Number of Living at Birth, or who enter on each year.	Logarithm strictly of the Surviving portion.	Of the Probability of Surviving each year.	3 per Ct.	4 per Ct.	..	..	3 per Cent.	4 per Cent.	..	..	3 per Cent.	4 per Cent.	..	..	Age.	The age the Life will attain, on the average expectation.	Also the fractional portion (further of the ensuing year.	
0	19.76	742489	-257511	84205	4.634 0896	1.870 6902	10.870	9.888	..	..	..	..	..	..	..	..	..	..	0	19	.76	
1	25.43	841965	-158085	25397	4.04 7798	.925 2942	14.079	12.150	..	..	..	..	..	..	..	..	..	..	1	26	.43	
2	29.12	931072	-068928	21383	.839 0740	.968 9834	16.223	14.908	..	..	..	..	..	..	..	..	..	..	2	31	.12	
3	30.23	965057	-049403	19909	.299 0574	.977 9966	16.947	14.647	..	..	..	..	..	..	..	..	..	..	3	33	.23	
4	30.78	969438	-030562	18926	.277 0540	.986 5202	17.363	15.024	..	..	..	..	..	..	..	..	..	..	4	34	.78	
5	30.73	970555	-029445	18347	.263 5742	.987 0203	17.448	15.118	..	..	..	..	..	..	..	..	..	..	5	35	.73	
6	30.65	976916	-023084	17807	.250 5945	.989 8575	17.517	15.200	..	..	..	..	..	..	..	..	..	..	6	36	.65	
7	30.36	981435	-018565	17396	.240 4520	.991 8614	17.469	15.181	..	..	..	..	..	..	..	..	..	..	7	37	.36	
8	29.93	986243	-013757	17073	.232 3134	.993 9637	17.333	15.087	..	..	..	..	..	..	..	..	..	..	8	37	.93	
9	29.34	989538	-010462	16838	.226 2971	.995 4325	17.102	14.909	..	..	..	..	..	..	..	..	..	..	9	38	.34	
10	28.64	990837	-009163	16662	.221 7296	.996 0022	16.801	14.669	..	..	..	..	..	..	..	..	..	..	10	38	.64	
11	27.90	988982	-011018	16509	.217 7318	.995 1884	16.465	14.397	..	..	..	..	..	..	..	..	..	..	11	38	.90	
12	27.21	987137	-012673	16328	.212 9202	.994 3731	16.148	14.140	..	..	..	..	..	..	..	..	..	..	12	39	.21	
13	26.56	985272	-014728	16117	.207 2933	.993 5562	15.849	13.897	..	..	..	..	..	..	..	..	..	..	13	39	.56	
14	25.95	983416	-016584	15890	.200 8495	.992 7372	15.569	13.669	..	..	..	..	..	..	..	..	..	..	14	39	.95	
15	25.37	981569	-018440	15617	.193 5867	.991 9169	15.307	13.455	..	..	..	..	..	..	..	..	..	..	15	40	.37	

Age.	YEARLY PROBABILITIES.		Number of Living at Birth, or who enter on each year.	LOGARITHMS.		Value of Life Annuity.		3 per Cent.		4 per Cent.		Pre-mium for Assurance of £100 at death.	Annual Premium, for whole term of Life.	Pre-mium for One Year.	The age the Life will attain, on the average expectation.	Also the fractional portion (further of the ensuing year.	
	Of the Life failing during the year; or Law of mortality yearly.	Of Surviving each year.		Logarithm strictly of the Surviving portion.	Of the Probability of Surviving each year.	3 per Ct.	4 per Ct.										
16	24.84	.980272	.019728	15329	4.185 5036	.991 3466	15.062	13.256	..	..	..	..	..	16	40	.84	
17	24.33	.978196	.021804	15026	.176 8502	.990 4258	14.826	13.064	..	..	..	..	..	17	41	.83	
18	23.86	.976056	.023944	14699	.167 2760	.989 4748	14.611	12.889	..	..	..	..	..	18	41	.86	
19	23.44	.974226	.025774	14347	.156 7508	.988 6597	14.418	12.733	..	..	..	..	..	19	42	.44	
20	23.04	.971940	.028060	13977	.145 4105	.987 6395	14.243	12.593	55.6029	3.648	2.724	47.7192	3.511	2.698	20	43	.04
21	22.69	.970356	.029644	13585	.133 0500	.986 9311	14.094	12.475	56.0369	3.713	2.878	48.1731	3.575	2.850	21	43	.69
22	22.37	.968910	.030900	13182	.119 9811	.986 7314	13.960	12.370	56.4372	3.772	2.921	48.5769	3.633	2.893	22	44	.37
23	22.05	.968450	.030650	12785	.106 7125	.986 5254	13.825	12.264	56.8204	3.833	2.966	48.9846	3.693	2.938	23	45	.05
24	21.73	.968976	.031024	12395	.093 2379	.986 3130	13.688	12.156	57.2194	3.896	3.012	49.4000	3.755	2.983	24	45	.73
25	21.41	.968488	.031512	12010	.079 5509	.986 0943	13.550	12.047	57.6214	3.960	3.059	49.8192	3.818	3.030	25	46	.41
26	21.09	.967982	.032018	11632	.065 6452	.985 8673	13.411	11.936	58.0262	4.027	3.109	50.2461	3.884	3.079	26	47	.09
27	20.77	.967462	.032538	11259	.051 5125	.985 6339	13.270	11.824	58.4369	4.095	3.159	50.6769	3.952	3.129	27	47	.77
28	20.45	.966924	.033076	10893	.037 1464	.985 3923	13.128	11.710	58.8505	4.166	3.211	51.1154	4.022	3.180	28	48	.45
29	20.13	.966368	.033632	10533	.022 5387	.985 1425	12.984	11.595	59.2699	4.238	3.265	51.5577	4.094	3.234	29	49	.13
30	19.82	.965792	.034208	10178	.007 6812	.984 8836	12.839	11.478	59.6922	4.313	3.321	52.0077	4.168	3.289	30	49	.82
31	19.50	.965198	.034802	9830	.3992 5648	.984 6164	12.693	11.360	60.1175	4.390	3.379	52.4615	4.244	3.346	31	50	.50
32	19.19	.964580	.035420	9488	.977 1812	.984 3383	12.545	11.240	60.5485	4.470	3.439	52.9231	4.324	3.406	32	51	.19
33	18.87	.963942	.036058	9152	.961 5195	.984 0509	12.396	11.119	60.9825	4.552	3.501	53.3884	4.405	3.467	33	51	.87
34	18.56	.963280	.036720	8822	.945 5704	.983 7525	12.246	10.996	61.4194	4.637	3.565	53.8615	4.490	3.531	34	52	.56
35	18.25	.962592	.037408	8498	.929 3229	.983 4422	12.094	10.872	61.8621	4.725	3.632	54.3384	4.577	3.597	35	53	.25
36	17.94	.961880	.038120	8180	.912 7651	.983 1209	11.941	10.746	62.3078	4.815	3.701	54.8231	4.667	3.665	36	53	.94
37	17.63	.961140	.038860	7868	.895 8860	.982 7867	11.787	10.619	62.7563	4.908	3.773	55.3115	4.760	3.737	37	54	.63
38	17.32	.960370	.039630	7563	.878 6727	.982 4386	11.632	10.490	63.2078	5.004	3.848	55.8077	4.857	3.811	38	55	.32
39	17.02	.959568	.040432	7263	.861 1113	.982 0757	11.475	10.360	63.6651	5.103	3.925	56.3077	4.957	3.888	39	56	.02
40	16.72	.958184	.041816	6969	.843 1870	.981 4489	11.317	10.229	64.1253	5.206	4.060	56.8115	5.059	4.021	40	56	.72



[illegible]

Age.	YEARLY PROBABILITIES.		Number of Living at Birth, or who enter on each year.	LOGARITHMS.		Value of Life Annuity.		Single Premium for Assurance of £100 at death.	Annual Premium, whole term of Life.	Pre-mium for One Year.	Single Premium for Assurance of £100 at death.	Annual Premium, whole term of Life.	Pre-mium for One Year.	Age.	The age the Life will attain, on the average expectation.	Also the fractional portion (further of the ensuing year.	
	Average Expectation of Life.	Of Sur-viving each year.		Of the Life failing during the same; or Law of mortality yearly.	Logarithm strictly of the Surviving portion.	Of the Probability of Surviving each year.	3 per Ct.										4 per Ct.
76	6.18	897607	102893	752	2.876 2132	953 0862	4.925	4.710	..	..	..	..	76	82	18		
77	5.93	891852	108148	675	829 2994	950 2928	4.652	4.457	..	..	..	..	77	82	83		
78	5.68	887043	112957	602	779 5922	947 9447	4.372	4.197	..	..	..	..	78	83	48		
79	5.11	878277	121728	534	727 5369	943 6314	4.077	3.921	..	..	..	..	79	84	11		
80	4.75	865672	134328	469	671 1683	937 3534	3.781	3.643	..	..	..	..	80	84	75		
81	4.41	852217	147783	406	608 5217	930 5502	3.499	3.337	..	..	..	..	81	85	41		
82	4.09	835260	164740	346	539 0719	921 8217	3.229	3.122	..	..	..	..	82	86	09		
83	3.80	809689	190311	289	460 8936	908 3183	2.982	2.887	..	..	..	..	83	86	80		
84	3.58	794872	205128	234	369 2119	900 2972	2.793	2.708	..	..	..	..	84	87	58		
85	3.37	779570	220430	186	269 5091	891 8551	2.620	2.543	..	..	..	..	85	88	37		
86	3.19	765517	234483	145	161 3642	883 9549	2.462	2.393	..	..	..	..	86	89	19		
87	3.01	747748	252252	111	045 3191	873 7552	2.312	2.251	..	..	..	..	87	90	01		
88	2.86	746988	253012	83	1.919 0743	873 3136	2.185	2.131	..	..	..	..	88	90	86		
89	2.66	741935	258065	62	792 3879	870 3659	2.013	1.967	..	..	..	..	89	91	66		
90	2.41	739131	260869	46	662 7538	868 7214	1.794	1.758	..	..	..	..	90	92	41		
91	2.09	705882	294118	34	531 4752	848 7321	1.501	1.474	..	..	..	..	91	93	09		
92	1.75	666667	338333	24	380 2073	823 9090	1.190	1.171	..	..	..	..	92	93	75		
93	1.37	562500	437500	16	204 1163	750 1225	0.839	0.827	..	..	..	..	93	94	37		
94	1.05	444444	555556	9	0.954 2388	647 8170	0.536	0.530	..	..	..	..	94	95	05		
95	0.75	250000	750000	4	602 0558	387 9400	0.242	0.240	..	..	..	..	95	95	75		
96	0.50	..	..	1	1.999 9958	..	0.000	0.000	..	..	..	..	96	96	50		

From Birth to 96, both inclusive; Sum of the Series. 692,860.

" " Total decrements. 34,205; and 692,860 ÷ 34,205 = 19.76 Expectation of Life at Birth.

## OBSERVATIONS ON THE PRECEDING TABLE.

As already stated by the writer, in a former paper on the subject, "In the absence of any large collection of facts and observations in Jamaica, from which such a table could have been deduced, he has necessarily been compelled to proceed upon probability and approximation, according to the experience and opinions of persons whose age and long residence in the community, or whose peculiar means of information, would give weight and authority to their statements; and, as a consequence, to any system which might be based upon them.

"Looking at the value of life in Jamaica, as respects the mass of the male population (subject of course to great variation on account of climate, habits of life, &c.), over the last thirty-four years, it has been the generally received opinion that the ratio of mortality, upon an average of years, was 5 per cent. annually—all classes, of course, select or otherwise, included in the category, but presenting very great variations in detail; and the same appears to have been the conviction of the Government Actuary, Mr. Finlaison, who distinctly states (*Report on the Clergy Fund, Votes Ass. xlv. app. 405*),—'Among those inured to the climate, the rate of mortality in Jamaica, at the age of 66 and upwards, is the same as it is in England; at all younger ages it cannot be safely taken at less than 5 per cent., without variation.'"

Accordingly, in the table in question, the mean expectation of life, as well at birth as at the age of 30, will be found to involve a mean mortality, *communibus annis*, of 5 per cent.; and while the mean expectation of life in Jamaica, at the age of 66, appears as 10 years, against 10.42 in the Northampton Table, the yearly rate of mortality *after* the age of 72 will be seen to be the same in both cases.

Between birth and the age of 10 inclusive, owing to the mildness of epidemical disease among children in a tropical climate, the mortality cannot be deemed higher in Jamaica than in the mother country, according to the Northampton observations; and the probabilities therefore appear, over such period, as equal also.

With regard to the interval between 14 and 51, the decrements at every age are treated as double those arising on the Northampton observations; while between 10 and 15, and between 50 and 73, the difference between the two extremes in each case is distributed over the intermediate ages by such interpolations as local opinion and experience seemed to warrant; the retarded ratio

in the increase of mortality in Jamaica, between 50 and 72 (in the earlier decade more especially), as distinguished from the experience in England, being reflected by the local table.

The probabilities being thus preliminarily determined, the terms of the series of the living, from the limiting age down to that of 73 in the Northampton Table, remain unaltered; the number of the living, 992 at the last mentioned age, forming in the first instance the first term of an *increasing* series, in which, proceeding by the *converse* operation, the *increasing* number at every younger age is made to develop itself successively until birth; when the number of the living, 34,205, thus generated, constitutes the base or radix of the Jamaica Table. Proceeding subsequently on that number as the first term of a *decreasing* series, the truth of the operation in the first instance is confirmed, and the eventual results are those arising on the construction according to the ordinary method; with this peculiarity, however, that the original probabilities are rigidly maintained in the second process by the insertion of the logarithms of the true surviving portion at every age, and not of the nearest *integral* numbers as they respectively appear in the different terms of the series; to meet which (and not the true surviving quantity) had the corresponding logarithms been inserted, the then probabilities, though an approximation and a very near one, would nevertheless have ceased to be the *same*; while, on the other hand, to have maintained a perfect equality between the two, the very inconvenient introduction of fractions into the column of the living would have been unavoidable. The true measure of probability in one of the two cases, at least, has thus been retained.

It is observed, in the valuable *Essay on Probabilities*, by Sir William Lubbock and J. E. D. Bethune, Esq., in allusion to Dr. Price's alteration of the original radix of his table to 11,650—"Why he chose this number in preference to any other we have not been able to discover;" but Dr. Price distinctly states that "he increased the radix from 1,165, in his first table, to 11,650, in order to adjust the decrements with greater regularity and precision, "thus leaving the number 1,165, which he first adopted, as the only point for speculative inquiry. Now his probabilities at every age must have been preliminarily determined by him on his 4,689 actual observations and their interpolations: and having been so, it must be obvious that, having assumed the limiting age and its adjacent numbers, the radix of his table in the outset would necessarily be an *unknown* quantity, obtainable only by proceeding from the apex or some adjacent point to the base, and not, accord-

ing to the ordinary method of constructing such a table, by the contrary process; and assuming the fact to be so, the number 1,165 will be found to be the quantity necessarily presenting itself at birth, and as forming, consequently, the radix of his table as first adopted by him, though subsequently increased in a tenfold ratio. Nor can it appear very doubtful, after all that has gone before, that in constructing a table of probabilities otherwise than from the facts themselves, and where a limiting age is assumed, that the correct process must be by proceeding in the *first* instance from the apex to the base, rather than by the alternative method more usually adopted; and that, in any such table, if the *true* measure of probability is to be preserved, and whole numbers only are to be admitted into the series of the living, *that true measure* can be presented only by the true logarithms as above stated. In this manner has the number 34,205 been obtained as the radix of the Jamaica Table, being the quantity found to be proportionate at the base to the number 11,650, which forms the base or radix of the Northampton; the higher mortality of the first being taken into account. The precise terms of the series in the Northampton Table, after the age of 72, are thus preserved as common to each; the probabilities after such age, as a consequence, together with the values deducible therefrom, being precisely equal also.

In reference to the adoption of a table of probabilities on *hypothesis* (if so to be termed), as based upon *general experience and observation of the variation at the different periods of life of the mortality among Europeans and descendants of Europeans residing in Jamaica, from an established European standard* rather than upon a *specific body of observations*—it may be affirmed, to say nothing of the impracticability of obtaining a body of specific data in Jamaica as affording a probable criterion of the general mortality, that there is danger also in relying implicitly on *any* body of observations as an index to future events. A law of mortality, *for instance*, has recently been deduced by a committee of English actuaries, associated for the purpose, from the combined experience of seventeen of the London Life Assurance Offices, embracing the very large body of observations involved in 62,537 policies of assurance; and the results so obtained might fairly have been considered, agreeably with the confident expectations entertained, as calculated to establish conclusively the true probabilities of human life as applied to assurances and annuities on lives in the United Kingdom. But what is the aspect of the case, analytically considered, now that these results are before the public? I quote the

words of the committee from whose combined labours they have proceeded, giving the more remarkable passages in italics :—

“In reference to the materials from which the whole of the tables have been formed, they represent a lower rate of mortality than can be expected to prevail in a *longer period of time* than that over which the present observations extend, for the duration of policies embraced *in nearly one half of the experience is under 5½ years*; and taking the whole of the experience together, which includes that of the Equitable and Amicable, the two oldest Offices existing, *the average duration of all the policies is not 8½ years*. This is readily accounted for when it is seen that more than half the policies effected were existing at the termination of the observations, and nearly a third had been discontinued during the lifetime of the parties assured. *The circumstance of recent selection should not be lost sight of by such persons as may use these tables either for the sake of comparison or as the basis of other tables for granting assurances. The difference in the rate of mortality between recently selected lives and those of longer continuance in the Society is clearly shown by Mr. Galloway in the tables of mortality deduced by him from the experience of the ‘Amicable’ Society, and which that Society, like the Equitable, has recently so disinterestedly printed for the use of its members.*” (See the work of Jenkin Jones, introduction, page 16, and elsewhere.) In fact, no scheme that ever was or ever will be propounded for the regulation of the future by the experience of the past, can possibly be divested of the character of “*hypothesis*”; much less can any such hypothesis acquire due importance or authority, until a long and well authenticated train of subsequent events, extending over a period equal at the least to the scriptural *complement* of human life, shall have tested the soundness of its predictions.

So circumstanced, all that can be aimed at is, to approach the truth, *in the first instance*, as nearly as our very limited knowledge of the future will permit; and, assuming an unquestionable margin of safety in the outset, to provide for such a measure of compensation in the sequel as time and the actual experience of the Society may dictate; remembering always as peculiarly applying to *any* theory of probabilities on which a Society may choose to base its computations, that

“Est *modus* in rebus; sunt certi, denique, fines,  
Quos ultra citra que nequit consistere rectum.”

With reference now to the determination and distribution of surplus, and the preliminary arrangements of a Mutual Life As-

surance Society:—Let a rate of interest somewhat below that which can probably be depended on be adopted as the governing rate in all computations, and let the table of probabilities be such as to embrace a marginal protection to the Office; proportionate, also, as nearly as can be ascertained, at *all* ages. Let the equated annual premium, as mathematically deduced from it, be  $P'$ ; let the assurances amount—say,  $R$ —to £100,000, and the yearly office expenses,  $E$ , to £500;  $\frac{E}{R}$  then will require  $\cdot 5$  as the addition to the premium for every £100 assured, the yearly contributions for expenses being irrespective of the age; and  $P'$ , at the different ages, *plus*  $\cdot 5$ , will compose the yearly prepayment, or premium  $P$ ; the net present value of the reversion of £1, or the single premium, computed from a similar table, being denoted by  $V$ , a quantity varying with the age. Let the several quantities  $P$ , subject to an exceptional feature to be presently noticed, be deemed fully equal to the calls and expenses of the Office, and something more, and let the same be deemed, as between contributors to a common fund, relatively equal also; the extra payment in each case *beyond that attaching to the standard* or best age in the table being severally taken as compensatory merely, for an extra risk,  $D$ ; and let the payment at such “standard” age be denoted by  $a$ , and the annuity of £1 by  $A$ .

But the law of average forms the basis of all such computations; and as no such law can be relied on in individual cases, nor can be expected to obtain otherwise than as regards the mass, it will be obvious that such a criterion becomes inapplicable whether derived from or as applied to a few observations or *particular* cases. Now in any particular community, let the experience, and also the number of cases to which we may be called on to apply the *first*, be so limited as to be confessedly obnoxious to that objection above the age of 50. Such risks can only be prudently accepted with a marginal addition *quasi* proportionate to their paucity; and therefore let such a quantity, varying between 50 and upwards, be denoted by  $Q$ ; then will it follow, that the expenses of the Office being rated on the £100 assured without reference to age, *and being therefore* proportionately furnished at the hands of all, in the case of a uniform assurance of £100; and the extra payments  $D$ , beyond that attaching to the “standard” age, being at the several increased ages merely compensatory; the *yearly* quantity  $a$ , thus paid in common by every member of the Society, will be the cardinal and exclusive feature for consideration, in arriving at a rule for the appropriation of a surplus; the annual prepayment  $a$ , and its

accumulations (rated, after the first, always from the *last* investigation) *over any number of years, n* (equal to  $a(1+A^{n-1})$ , being, *primâ facie*, the exponent of the rights of each member thereon; but *a* being a constant multiplier, in such a series the ratio of the terms will remain unaltered by its elimination; the *simple* equivalent exponent at every term of the series consequently becoming  $(1+A^{n-1})$ ; and the dividend surplus *S* (after deduction of the

"rest" or guarantee fund) having been determined,\*  $\frac{S}{\sum (1+A^{n-1})} \times (1+A^{n-1})$ , (where  $\sum$  denotes merely the summation), will exhibit the cash payment, *s*, in the case of a uniform assurance of £100, to which each member will be entitled who may have contributed one (or more) full year's premium; any who may have contributed *less* being, in respect to such fractional portion, excluded from participation.

But the preceding theorem supposes a uniform assurance of £100; and, the assurances *varying in amount*, let every hundred or number of hundreds so assured on the same life be treated as 1, 2, 3, 4, &c., and be denoted by *h*; then will the terms of the ratio become  $h \times (1+A^{n-1})$ , and  $\frac{S}{\sum [h(1+A^{n-1})]} \times h(1+A^{n-1})$  will give

\* In determining the surplus, and the value of each policy, it will be proper to throw off, whether after the age of 50 or in the case of lives taxed as below the average, any extra quantity beyond *P* (or mathematical premium, *plus E*).

With the preceding exception, under arrangements such as the above, it will be found most convenient and also most correct to take the entire value of the future premiums, without deduction, in the first instance; deducting at the conclusion of the process, from their aggregate value, that of three months' expenses *plus* the product of a life annuity of £1, payable *quarterly*, multiplied by the amount of the actual annual expenses; the value of the annuity being taken as of the mean age at investigation; *no anticipation of future profits* then occurring.

In throwing off *E* or any other quantity, and multiplying the difference in each case by the annuity *plus 1*, the effect is clearly to take one entire year's expenses, &c., *in hand*; which is excessive.

The value of *V* will be most correctly arrived at by stating the ages, not as of the policy standard, but accordingly as the birthday may be nearer to the opening or termination of the Office year (which also would be the preferable mode of rating the premiums of entrants, and of stating the mortality results in a Society); and at whatever periods of the year the future premiums may be payable, *all* premiums should be taken at their *yearly* value, and *all* should be treated as due on the first day of the official year, their product being reckoned accordingly; the Society debiting itself with any past payments and the interest upon them, in respect to which risks may be *still* subsisting. Finally, in lieu of taking credit substantially for "*assets*" to the extent of the present value of the future premiums, by raising a *second* account for *liabilities* (in which the same are included), it were more correct, and more intelligible also, to raise one account only, showing the difference as constituting the "*liability*"—*i. e.*, the value of the aggregate reversion *minus* that of the rent charge attaching to it; each being inseparable from the other—each, nevertheless, being exhibited at every investigation, with the features expressly given by which the value of such rent charge may be diminished; nor after the lapse of the first seven years of a Society's existence, does there appear any rational ground for longer intervals between the investigations than three years, if due regard is to be had to the true interests of the members of such an Association.



the ultimate appropriation  $s$ , proportionate in each case to the amount assured and to the duration of the policy, *computing, after the first, always from the last investigation.*

Now, as the general rule of an Office—as distinguishable from the *exception* to be presently adverted to—let it be supposed that a reversionary bonus  $B$  is to be added to the previous assurance, equivalent to that which, as a single premium,  $s$  would purchase; then  $\frac{s}{V}$  will give the true reversionary quantity  $B$ . Moreover, let

there be also an *alternative*, at the option of the different numbers—viz., the power to claim, in lieu of  $B$ , the equivalent reduction of the annual premium; the Society, be it supposed, professing to grant annuities on the probabilities of the corrected Chester Table, involving higher probabilities of life than those of the table from which its premiums were computed.

Here, then, the reduction of the yearly premium being equivalent to granting on the same life a counter annuity by way of set off; in the case of an election, to be exercised with or without the concurrence of the Office, were the latter to base the reduction of the premium on the value of the annuity from which its premiums were originally computed, it would first expose the Society to the effects of *selection* highly injurious as against itself, and would further commit the anomaly of granting an annuity at *one* rate, while, for the same annuity, *and perhaps upon the same life, it was professedly* demanding a widely *different* consideration.

Where, therefore, such an alternative is to be left to the independent option of the member (who will naturally, if a bad life, accept the bonus—if a good one, demand the reduction in the premium)—if the Office is to preserve a due measure of protection, and of consistency also, the reduction in the value of the annual premium will be made equal to  $\frac{s}{1+A}$  where the divisor represents the value of the life annuity of £1 by the *Chester* Table, the first payment in hand; its value being rated, *as in the case of*  $B$ , as of the *age* at the time of computation.

It is mainly to the anomalies admitted in the construction of the premiums of an Assurance Office *in the outset*, that the difficulty in the sequel of determining and correctly distributing a surplus is attributable; nor, among them, is any more prominent or more objectionable in principle, than the very frequent practice of providing for the annual expenses of an Office (apart from calls) by an addition to the annual premium at every age, rated, not upon the

£100 assured, but upon the consideration or premium annually paid for it at the different ages; such a procedure furnishing the only defence, *on the other hand*, for the erroneous and inequitable system of apportioning a surplus regardless altogether of the considerations attaching to incidental profits and to different decrements, in the ratio of the *accumulated premiums*; for beyond the obvious inequity as regards the *first* objection, as respects the *last*, the higher or lower premiums at the different ages, apart from the feature for expenses, being only proportioned to the different risks, and being therefore so far proportionate to one another, must be so far, also, *equally creative of a surplus*. Where, then, the *expenses* have been rated on the *premiums*, the accumulation of  $a + E$  *only* should be the rule or measure of distribution.

Nor is the practice of various Offices less inequitable, which, in lieu of adding to a policy a reversionary bonus rated according to the age at the time of computation, makes the reversionary addition the same *at all ages in regard to the £100 assured*, and indifferently whether the assured be aged 30 or 90—an enormous injustice to the younger contributors, and to those more especially who, entering a Society between 20 and 30, and usually with more limited means than those of older entrants, are required, on the guarantee of compensatory *prospective* advantages, to contribute so largely and so long in excess of the consideration which an assurance from year to year, during a corresponding period, would legitimately require;\* and (as all experience has shown) with the lower probability, too, of the maintenance of a policy over the younger ages as compared with that over a more advanced period of life, when, comparatively, few or no abandonments occur—an important feature in the practical working of assurances, and one which must have contributed largely to the almost incredible proportions to which the funds of some of the older Offices have attained; and if a new feature in the doctrine of probabilities, now propounded perhaps for the first time, one at least, unfortunately for the extension of a benevolent provision at the *younger* ages, never sufficiently adverted to.

The last and not the least anomaly it may be necessary to notice here, is that resulting from the doctrine that members whose

\* See the comparative rates of the London Equitable Society between the ages of 20 and 42, and between 30 and 50; as applied to an equated annual premium over the whole term of life, and to the equivalent premium *rated yearly, for a single year's assurance, toties quoties*. In the London Amicable and other Societies, the corresponding excess here referred to will be found to extend over a longer period even than the interval involved in the case of the Equitable.

lives have been under assurance for the *longest* period are to have preferable advantages over the subsequent entrants.

Now, if from such a doctrine any *future* advantage is to be inferred beyond that attaching to the duration of the policy since the last period of investigation (as above provided for), *then*, looking at the benefit of *selection* in the *outset* of an assurance, and at the *converse* of the proposition *also*, such a position will be found to be untenable; inasmuch as the *subsequent* entrants must be considered to bring with them every compensatory *quid pro quo*—first in the increased influence which ensues, and secondly in that recruiting of the vitality of the body corporate which results from their admission, and which, as it were, by the infusion of younger blood into older veins, is so contributory, if not absolutely indispensable, to its well being and support; for of an Assurance Association or Society it may emphatically be stated, “*Vires acquirit eundo*,” while, on the other hand, the *ratio* of its annual expenditure decreases with the increase in the numbers who compose it.

NOTE.—We have omitted some of Mr. Marshall’s tables and formulæ, as not being of any practical use here, and have also substituted notation used in this country for that given by him, which would not be readily understood. It is to be regretted that his data are not of a more authentic character. They are nevertheless not without value, as coming from one whom a residence on the spot must render familiar with whatever bears upon the facts.—  
ED. A. M.

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DUTY ON FIRE INSURANCE.—One of the most remarkable mischiefs of modern times is, that taxes, which demoralize the people, and are avowed by all parties to be iniquitous and hurtful, should be still tenaciously retained. Such a tax is the one in question, seeing that it is a tax on one of the chief necessities of civilized life. The working man must either leave his tools, his clothes, and his furniture—the plank, as it were, which stands between him and pauperism—uninsured, or he must pay three or four times as much as is required for the mere assurance. If the bread tax was odious, surely the fire insurance tax is indefensible. The striving tradesman cannot insure his stock-in-trade—partly the result of hard earnings, partly the property of his creditors—without paying thrice the amount that the Office requires. Thus, when the fatal fire comes, the industrious citizen is debased into the pauper, and the losses of his creditors contribute to other bankruptcies. Such systems are systems of national suicide rather than systems of just assessment of national burdens.—*Patriot*.

## FOREIGN INTELLIGENCE.

**BELGIUM.**—We understand that a Statistical Congress is about to be held in Brussels, with the view of forming some general plan for the collection of facts relating to population, commerce, and the social condition of various countries, and enabling the results to be compared on an uniform system. M. Quetelet, the learned secretary of the Académie Royale de Belgique, and corresponding member of most of the learned societies of Europe, has been indefatigable in his exertions in forming this reunion; and from the list of distinguished political economists and writers, from every country in Europe, who have sent in their names and promised their attendance, we cannot but anticipate the most important consequences. We shall probably in our next Number be able to notice some of the discussions, and publish the results of the labours of the Congress.

**GERMANY.**—*Berlin.*—*Works published in reference to Legislation on Assurance.*—Under the title *Die Privat Feuer Versicherung in Preussen* (Private Fire Insurance in Prussia), a work (published by Carl Heymann in Berlin, 1853) has appeared, by Herr Assessor Hugo Meyer, for the Magdeburg Fire Insurance Company. It comprises a collection of the laws, ordinances, legal decisions, and professional opinions on the subject, and is at the present time of the utmost value in the assurance world, especially for those who have correspondence in assurance with Prussia. If we reflect in how many places the Prussian laws relating to this subject are scattered, and at what different periods they were passed—that the most important law of 8th May, 1837, has been considerably altered by later decrees and construction—it is well to be placed in possession of such copious materials, and to see how far they are clearly applicable in all cases. The author has brought great labour to bear in the compilation, and much knowledge and experience in editing it, so that the book is as complete as it is intelligible.

In the introduction the author discusses the general laws of the country (*Allgemeine landrecht*) and the general legislative enactments (*Allgemeine gerichtssordnung*), the Rhenish code of laws (*Rheinische gesetzbuch*), the law of 8th May, 1837, together with the ministerial instructions of 10th June, 1837, relating thereto, the penal code and ministerial rescripts thereon, and is divided into three principal parts. The first part, on the assurance against fire risks, treats especially of the Assurance Companies, of the procuring assurances by agency, of the conditions of an assurance, of assurance contracts, and of the magisterial regulations for annulling assurance contracts. The second part treats of fire losses, especially of the cause of the damage by fire, of the course to be pursued by the assured after a loss has arisen, of the rights of the assurers on the proof of claims, on the extent of the obligation to indemnify for losses, and of the nature of the warranty to make good the loss. The third part relates to the processes of law in fire insurance matters, and is in every respect so copious and made so clear, even for the non-legal reader, that the book is not merely necessary for all boards of management and leading agencies, but should also lie on the table of every assurance agent whatever. Besides an index according to the order of time, there is subjoined to it an index of matters,

which is required by the copiousness of the work (332 pages), and which greatly facilitates the search for information. The author has, by this well-timed and admirable work, deserved not only the thanks of the assurer, but of the assured; and we consider ourselves under obligation strongly to recommend the work to all those who take an interest in assurance and in the legislation relating to it.

*The Feuer Versicherungs-wesen nach Preussischem rechte* (Practice of Fire Assurance according to the laws of Prussia) is a collection of the laws relating to this subject, and administrative ordinances, with their practical application. Edited by H. Gräff, Counsellor of Justice, Breslau. Geo. Philipp, Aderholz, 1852. The work is divided into four sections, and contains in the first the law of 8th May, 1837, and the ministerial instructions of 10th June, 1837; in the second, the regulations of the *Allgemeine landrechts* concerning assurance against fire risks; in the third, the regulations of the Rhenish code relating to the assurance against fire; and in the fourth, the ordinances and decisions which have been published since the appearance of the latter.

It may be judged, from this summary of the contents, that the book is not without practical value, and must have been of great service up to the appearance of the above-mentioned work by Herr Assessor Meyer; but it cannot be compared in value with the much fuller and more elaborate labours of the last, nor does the editor himself make pretensions thereto.

MASIUS, *Rundschau der Versicherungen.*

*Gotha Life Assurance Bank.*—Extract from the Report for 1852.

I.—Assurances.

		Persons.	Sums Assured.
Assurances in force at the beginning of the year		16,855	£3,814,614
New assurances during the year		1,423	332,372
		18,278	4,146,986
Assurances cancelled—	Persons.	Sums Assured.	
By death	346	£82,757	
Policies surrendered, } lapsed, &c. . . }	217	60,171	
		563	142,928
Assurances at the end of the year		17,715	£4,004,058

Classification of Assurances :—

Whole life—			
Payable at death, or on attaining the 90th year of age . . . . .	}	17,313	£3,904,159
Payable at death, or at any younger age than the 90th year . . . . .		146	35,443
		17,459	3,939,600
For terms of years . . . . .		203	53,243
Survivorships . . . . .		53	11,214
		17,715	4,004,057
Sex of assured—			
Males . . . . .		16,565	3,776,600
Females . . . . .		1,150	227,457
		17,715	£4,004,057

Age.	Amount of Assurances.									TOTAL.		
	£29—£143.	£157—£286.	£300—£429.	£443—£571.	£586—£714.	£729—£857.	£871—£1,000.	£1,014—£1,143.	£1,157—£1,286.		£1,300—£1,429.	
	Number of Persons.											
										Persons.	Sums Assured.	
											£	
18—20	8	..	..	..	..	..	..	..	..	8	771	
21—25	68	9	2	1	3	1	..	..	..	84	12,271	
26—30	433	83	19	16	12	7	..	..	..	572	96,429	
31—35	1082	281	92	54	38	20	3	7	..	20	1,602	
36—40	1468	428	148	64	68	24	3	7	..	27	2,237	
41—45	1857	619	209	96	64	36	9	18	1	33	2,942	
46—50	1915	675	214	152	84	54	10	21	1	34	3,160	
51—55	1594	611	215	140	74	44	10	35	2	30	2,755	
56—60	1162	460	137	96	56	46	6	15	4	19	2,001	
61—65	707	261	99	76	52	30	6	14	3	14	1,262	
66—70	389	156	56	35	21	16	8	11	..	2	694	
71—75	167	56	21	12	6	6	2	7	1	..	278	
76—83	76	30	4	7	2	..	..	1	..	..	120	
Total ..	10,926 persons, £1,122,257.	3,669 persons, £901,886.	1,216 persons, £491,571.	749 persons, £417,271.	480 persons, £338,843.	284 persons, £242,271.	57 persons, £56,157.	136 persons, £154,285.	17 persons, £21,101.	181 persons, £256,415.	17,715	4,004,057

The average age of the assured was, at the beginning of the year, 48 years; and at the end, 48 years 2 months. The average amount of the sum assured on each life was, at the beginning of the year, £226; and at the end, £226. 10s.

## Deaths :—

Age.	Assured in the course of 1892.	Should die, according to the Tables used.	Died.	Plus.	Minus.	Mortality per cent.
15—25	95	0·64	..	..	0·64	..
26—30	595	4·96	2	..	2·96	0·34
31—35	1,651	16·19	15	..	1·19	0·91
36—40	2,293	25·72	19	..	6·72	0·83
41—45	3,004	36·53	36	..	0·53	1·20
46—50	3,241	49·42	47	..	2·42	1·45
51—55	2,837	56·08	50	..	6·08	1·76
56—60	2,066	52·71	51	..	1·71	2·47
61—65	1,314	43·04	40	..	3·04	3·04
66—70	739	33·26	42	8·74	..	5·68
71—75	309	22·47	29	6·53	..	9·39
76—88	134	18·52	15	..	3·52	11·19
	18,278	359·54	346	15·27	28·81	

Of the 346 persons on whose lives the total sum of £82,757 was assured, only 332 (for £78,415) were entitled to full payment. For one assured (£143), who had shortened his life by intoxication, the half of the sum assured was paid by compromise. The other 13 (assured for £199), who had died by suicide, left to their representatives no claim to the sum assured, but only to a return out of the reserved fund. This return was, in two cases of suicide which were "*non compos mentis*," the full value of the policies; in the other 11 cases of intentional suicide, the usual purchase price.

The proportion of deaths was 316 males and 30 females. In the course of 1852, 17,074 males and 1,204 females being assured, the rate of mortality of the former was 1·85 per cent., of the latter 2·49 per cent. The mean age of the males and of the females was about the same; the latter showed, as usual, a much higher mortality than the former.

A very accurate table in the appendix of the report shows, in the case of every death, the age of the assured at the date of the assurance, the age at his death, and the cause of the death. There died 48 by apoplexy, 41 by consumption (phthisis), 38 by dropsy, 27 by nervous fever, 20 by marasmus senilis, 13 by suicide, 11 by cholera Asiatica, &c.

## II. Cash Account for the Year 1852.

Dr.	£.
Invested capital at the end of 1851 . . . . .	922,174
Amount of new premiums for 1852 . . . . .	11,284
" renewal premiums for 1852 . . . . .	131,233
" premiums paid in advance . . . . .	54
" commuted premiums . . . . .	57
Interest on loans . . . . .	36,839
Dividends unclaimed . . . . .	271
Profit from agio on money, existing bonds, bills of exchange, &c. . . . .	145
House rent, deducting all charges . . . . .	95
Extra receipts for deposits, &c. . . . .	524
Total . . . . .	£1,102,676
Cr.	£.
Paid 4 claims for the year 1850 . . . . .	799
" 49 " " 1851 . . . . .	12,443
" 280 " " 1852 . . . . .	64,314
" 6 claims fallen due in lifetime . . . . .	1,472
Dividends to the assured for the year 1846 (residue) . . . . .	640
Dividends to the assured for the year 1847 . . . . .	26,787
For policies purchased . . . . .	2,327
Agents' commission . . . . .	3,189
Expenses of management . . . . .	4,036
Extraordinary expenses . . . . .	49
Invested capital at the end of 1852 . . . . .	986,620
Total . . . . .	£1,102,676

## III. Balance-sheet for the Year 1852.

Dr.	£.
58 claims unsettled . . . . .	15,728
Unclaimed dividends for year 1847 . . . . .	603
Deposits received in cash . . . . .	4,446
Reserve, or the value of all existing policies at the 31st Dec., 1852., without any regard to the premiums or parts of premiums paid for the time after this date . . . . .	733,106
Carried forward . . . . .	£753,883

	Brought forward	£753,883
Gross amount of premiums in advance for the time after the 31st		
December, 1852 ( <i>Prämienübertrag</i> )		67,337
Surplus (guarantee fund)—		
Surplus of 1848-51	£122,874	
Surplus of 1852	42,526	
		165,400
Total		£986,620
Cr.		
Cash in hand		£3,531
Loans		911,109
Advances on policies		34,105
Interest due		11,128
Balances due by bankers		9,329
Balances due by agents		12,618
Value of the Society's building		4,800
Total		£986,620

The guarantee fund comprehends, according to the former balance-sheets—

	£
The residue of the surplus of 1848	14,647
The surplus of 1849	31,020
"    1850	30,388
"    1851	46,818
"    1852	42,525
Total	£165,398

In the course of 1853 the surplus of 1848-49 is divided among the assured who have paid premiums in 1848. It consists of

	£
The residue of surplus of 1848	14,647
Part of the surplus of 1849, corresponding to the premiums paid in 1848, which are due in 1849 (£57,334)	14,463
Total	£29,110

The premiums for whole life assurances and survivorships paid in 1848 being £121,291, the surplus of £29,110 gives a dividend of 24 per cent. This dividend is made in the course of 1853, on all existing policies by way of reduction of premiums, and on all policies cancelled by death or by surrender, by payment in cash or by bonds, which are issued when the policies are given up.

The investments on loans and mortgages are

	£
832,691 first mortgages on land, of at least double the value.	
27,710 " house property, of at least double the value, and insured against fire.	
18,443 on the bonds of public Loan Societies, based on land securities.	
15,257 in bonds of public institutions, whose management is under the control of the Government.	
17,008 on mortgage of stocks.	
£911,109 . Total.	



*Lubeck.—Marine Insurance Companies.*—We have been favoured by our able correspondent at Hamburg, Herr W. Lazarus, with the following summary of the accounts of these Companies for 1852. The accounts for 1850 will be found in this *Magazine*, vol. ii. p. 384. (Marcs current, 100 = £6.)

	Zweite Assoc. Comp. von 1824.	Dritte Assoc. Comp. von 1826.	Versicherungs Verein von 1835.	See Assoc. Verein von 1838.	Flunke Assoc. Comp. von 1843.	Sechste Assoc. Comp. von 1852.
<i>Creditor:—</i>	£	£	£	£	£	£
Capital account.....	{ 180 sh. } { of 180l. } 32,400	{ 150 sh. } { of 180l. } 27,000	{ 160 sh. } { of 180l. } 28,800	{ 120 sh. } { of 180l. } 21,600	{ 110 sh. } { of 180l. } 19,800	{ 80 sh. } { of 180l. } 14,400
Assurance account.....	13,721	17,290	4,992	7,398	3,547	825
<i>Debtor:—</i>	£	£	£	£	£	£
Shareholders' capital subscribed.....	46,121	44,290	33,792	28,998	23,347	15,225
Assurance account.....	29,160	24,300	25,920	19,440	17,820	12,960
Money at interest.....	5,617	1,563	6,452	5,904	4,407	1,560
Premium debtors.....	4,213	3,342	894	2,580	125	79
Cash account.....	47	51	70	125	10	329
Dividend account.....	604	334	102	550	..	297
Advanced money on averages.....	6,480	14,400	..	399	870	240
Bills of exchange.....	..	300	354	..	240	..
	46,121	44,290	33,792	28,998	23,347	15,225
Premiums brought from balance of last account.....	9,056	16,329	..	4,520	2,262	..
Net premium received in 1852.....	2,322	1,251	2,600	4,709	3,287	2,449
On amount underwritten of.....	£123,175	£91,284	£149,761	£243,151	£170,358	£129,752
Interests.....	43	42	61	34	16	2
Receipts.....	11,421	17,622	2,661	9,263	5,565	2,451
Losses and averages.....	£2,763	£1,449	£3,496	£5,846	£6,027	£1,253
Brokerage and expenses.....	554	446	502	483	396	373
Dividends paid.....	6,480	14,400	1,440	1,440	..	1,800
Reserved for averages valued at.....	2,490	1,031	2,580	2,670	2,004	..
Reserved for current risks and unknown losses.....	814	596	521	624	498	285
Under balance of last account.....	..	..	7	..	..	..
Interests to shareholders.....	..	..	115	..	..	..
Payments.....	13,101	17,922	7,221	11,063	8,925	3,711
Under balance.....	1,680	300	4,560	1,800	3,360	1,260
Current risk.....	£8,556	£5,544	£6,000	£7,200	£7,275	£7,200

*Saxe Meiningen.—Fire Insurance Laws.*—The Duke of Saxe Meiningen has promulgated a law respecting fire insurance, the purport of which is as follows:—

Article 1. The assurance against the risk of fire of buildings and removable objects is only so far lawful as that the amount of the assurance shall not exceed the true value at the time of the assurance.

Art. 2. During the period of assurance, if the value of the object to be assured shall be diminished, a corresponding reduction of the sum assured may be made by the official managers.

If objects be assured the nature and value of which are liable to change, as storehouses, large quantities of natural products, or other stores warehoused for sale or consumption, the necessary precaution shall immediately be taken to make the sum assured correspond with the value of the object assured.

Art. 3. The double assurance of one and the same object by different Companies is prohibited.

Art. 4. The General Fire Insurance Company of the Principality of Hesse may retain the right to the assurance of immovable property according to their existing contracts, laws, and regulations, or as they may be further empowered hereafter.

Art. 5. The assurance on the part of other Assurance Companies than that of Hesse, as well as the undertaking of assurances by the latter, is only permitted through the agency of recognized agents, who, as well as the Assurance Companies themselves, must have a special license for this purpose.

The assurance of buildings by these Companies and by the above Company is only allowed when the buildings to be assured in towns lie beyond the circuit of the walls, and are distant at least 100 feet from other buildings or building grounds.

Art. 6. The present law applies to all assurance contracts which shall be either concluded after the time of its publication, or should be renewed for six months after the publication of this law, but not to those already existing. The managers are nevertheless entitled, in cases where an excess of assurances according to these regulations should be discovered at any time, to effect a reduction to the rate prescribed in Article 1.

Art. 7. The requisite further regulations for carrying out these regulations will be made public.

Contraventions against the present law, as well as against the regulations to be hereafter published for carrying it out, may be punished by fines up to 100 gulden (£8. 10s.), or by corresponding terms of imprisonment.

The ordinances of the Ministry of State are dated 3rd March, and will either be given complete or in abridgment in the next Number.

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## MISCELLANEA.

*First Parliamentary Committee on Insurance.*—On the 22nd February, 1719 (i.e., 1720, N.S.), a complaint having been made to the House of Commons to the effect that public and private subscriptions were being entered upon, for, as it was stated, "several unjustifiable projects and undertakings,

whereby great mischief may accrue to the public," a Committee was appointed to inquire into and examine the several subscriptions for fisheries, *insurances*, annuities for lives, and all other projects carried on by subscription in and about the cities of London and Westminster, and to inquire into all undertakings for purchasing joint stocks, or obsolete charters.

The Committee immediately proceeded to business, *sat de die in diem*, presented two addresses to His Majesty, praying that he would give directions to the proper officers to lay before the House all petitions that had been presented in the preceding three years for and against charters of incorporation to insure ships and merchandise, and for establishing annuities on lives, &c.

These petitions were accordingly, and with due formality, submitted to the Committee. The first respecting insurance is dated 25 January, 1718 (*i. e.*, 1719, N.S.), and is signed by 286 merchants and traders—headed by Sir Justus Beck, of Leadenhall Street—praying for the establishment of an incorporated Company of Insurers with a joint stock, and its argument avers that such a Company would preserve many of His Majesty's "good subjects and their families" from that ruin to which they were exposed by being assurers in a private capacity.

The private underwriters, naturally alarmed at the idea of the competition of an incorporated Insurance Company, immediately got together 375 signatures of City of London merchants and traders, to a counter-petition, headed by Sir Gilbert Heathcote; and the gist of their objection was, that the establishment of a Corporation would lead to undue preference, and to delay and refusal to insure, when ships might be missing, and in stormy weather. The Bristol merchants also came forward with an adverse petition, urging that insurance business was in a satisfactory condition, the premiums charged in London and Bristol being lower at that time than in any other parts of Europe.

Petitions and counter-petitions were referred in due course to the Lords Commissioners of Trade and Plantations, or, more immediately, to Sir Edward Northey and Sir William Thompson, the Attorney and Solicitor General, and the petitioners for and against the charter were heard by their counsel. Some very fair reasons were stated on behalf of the prayer of the petition—such as, amongst others, cheapness of rate of insurance by a Corporation, quickness in its transactions, there being only one subscriber to policies, whereas private underwriting required "the picking up of insurers here and there;" better security, from the million of capital to be subscribed; increased facility of instituting suits against a Corporation, it being as "one" against whom the suit may be brought—"whereas, if twenty or thirty were to join in a partnership to insure, every one must be named in a suit to be brought against them."

Some affidavits were annexed to the petition for the charter. These do not refer to points of much interest. We may, however, learn, that foreigners had at the time a great appreciation of the advantages attending insurances effected in England. Robert Fletcher, a merchant, who made an affidavit in favour of the charter, stated "that, being lately in Holland, and frequently in conversation with several merchants there, and often discoursing of a subscription then going on in London towards a fund for insuring ships and merchandise, they very much approved of the project, believing that, if completed, it would be a better security for the insured than any method in practice at the time." On the other hand, the counsel for the petition against the charter insisted (and very probably with truth) that the subscription was only got up for stock jobbing, to make another stock to transact. The keynote of the objections is, however, contained in the following part of their statement:—"Insurance of ships is necessary for foreign trade; and if the present method be not found inconvenient, there is no reason to set up a Corporation for insuring; *besides that by the present method many families are supported, and there will be no reason to destroy them without absolute necessity.*" There then follow some plausible, but not very profound, exceptions to the scheme of incorporation. The petitioners for the charter had appealed to the *credit* which a Corporation would have at stake in its dealings.

To this the objectors answered, "A Corporation has no sense of shame" (!)—an answer reminding one of a certain amusing *bon mot* with reference to Corporations, which owes its paternity to a great law Lord of more recent times.

In the course of the evidence on behalf of the objectors to the charter, a Mr. Aston deposed that, for the most part, he had been allowed by his correspondents after the rate of one per cent., and half per cent. for standing bound for the insurers, over and above the usual allowance of half per cent. for causing the insurance to be made; and that he had *never lost one penny for standing bound for the insurers*. This would have been strong testimony, if corroborated by general experience; but the petitioners for the charter replied at length, and brought some witnesses to depose that *there were great losses by private insurers*—that about three years preceding, many English insured at Hamburg, as judging it more secure—and that, if a Corporation were erected in London, it would be the interest of foreigners to insure with them, as they would thereby save the premium to *insure the insurer*.

The Attorney and Solicitor General summed up; and reported to the King, to the effect that the business of insuring ships had always been carried on as it then was—that there was no Corporation in Europe for insuring ships—that the making an experiment in a thing of the sort, if it should prove amiss, would be of the utmost consequence to trade—and that they could not advise the erection of a Corporation against which there were so many and great objections, and especially the method then used being approved of both at home and abroad. And thus this project fell to the ground.

The lawyers or agents for obtaining the charter were Messrs. Bradly and Billingsley, of Mercers' Hall; and when the matter came before the House, Sir William Thompson entered into long explanations of how "one Bradly" and "one Billingsley" had endeavoured to bribe him and Sir Edward Northey, not only in this but also in another undertaking, called "The Lord Onslow's Insurance."

It is no part of our subject to include more than a passing notice of the state of things divulged in the statements and evidence of accusations and recriminations respecting *bribery*, with which many folio pages of the Parliamentary Report on the subject are taken up. The itching for dispute got very strong among the lawyers—a sad *exposé* took place; and Sir William Thompson accused the Right Hon. Nicholas Lechmere (Sir Edward Northey's successor in the Attorney-Generalship) of receiving large sums of money from the parties contending for charters, which, Sir William Thompson averred, were put up to public bidding. Sir William summoned twenty-five witnesses to prove these matters. The twenty-five witnesses, however, did not convince the House of Commons, and it came to the resolution that the accusation against the Right Hon. Nicholas Lechmere was malicious, false, scandalous, and utterly groundless.

From one of the papers delivered in to the Committee by Mr. Case Billingsley, the acting partner of Bradly and Billingsley, it appears that the scheme for the "Public Assurance Office, with one or two millions of capital," was concocted by him and Bradly, and their friends, about the year 1716, and that subscriptions were entered into at that time.

Having said sufficient about this scheme, and which (adopting the system of nomenclature of the Report) we may call the *Billingsley Insurance*, the next project we have to notice is the "*Mines Royal Insurance*." This project was embodied in a petition of the "Mines Royal Mineral and Battery Works," praying to be incorporated for insuring ships and merchandise—the capital to be one million two hundred thousand pounds. Mr. Attorney-General Lechmere reported on this project, and included in his report several memorials and affidavits, which include some interesting practical evidence.

F. H.

(To be continued.)

## CORRESPONDENCE.

## THE INTEREST QUESTION.

*To the Editor of the Assurance Magazine.*

SIR,—“What is the proper expression for the amount of £1, with the fractional part of a year’s interest?” is not of importance from any differences in the money result of problems of any practical moment being involved in it, but from the diversity of opinion which has existed among modern authors, and the embarrassment which this gives to writers who may have occasion to treat of questions which involve the point in dispute.

Interest is the rent paid for the use of money; it is payable at the expiration of such intervals of time, and is such a proportion of the sum lent, as may be agreed upon between the borrower and the lender. Sometimes the interest is not paid when due, but is added to the principal sum; sometimes the sum lent is repaid, not at the expiration of a period when interest falls due, but at some intermediate time, and it is required to know what, in such cases, should be paid as interest.

For the sake of brevity of expression, I shall assume the period of conversion to be a year, and  $r$  to be the interest upon every £1 payable at the end of each year; but the reasoning is not the less general on that account, since any other period of conversion may be substituted with equal propriety, employing  $r'$ , the amount of interest upon every £1 actually agreed to be paid at the end of each period, instead of  $r$ . The assumption is also an appropriate one, since the recent discussions in your *Magazine* have been based upon it.

The general question may be resolved by an application of the following self evident principle: “Interest upon money for equal periods of time will be proportional to the amount lent.” It is granted by all writers that the amount to which £1 will accumulate in  $n$  years,  $n$  being a whole number, is  $(1+r)^n$ ; also, that the amount of £1 at the end of  $n+\frac{1}{2}$  years is the amount at the end of  $n$  years multiplied by the accumulation of £1 in half a year. The same remark will apply to any other fraction of a year; so that the question is reduced to that of finding the amount to which £1 will accumulate in half a year, in a quarter of a year, &c.—that is, the contract being to pay  $r$  interest for every £1 on loan, at the end of a year from the grant of the loan to determine the amount equitably due as interest, if the loan is repaid at the end of half a year, &c.

Let the equitable interest of £1 for half a year, as yet undetermined, be  $x$ , or the amount of £1 in half a year be  $1+x$ ; then, by the principle, in the second half year this  $1+x$  will accumulate to  $(1+x)(1+x)=(1+x)^2$ , which should be equal to  $1+r$  by the wording of the contract that  $r$  is the interest due at the end of the year.  $\therefore 1+x=(1+r)^{\frac{1}{2}}$ . The intention is, to place the lender in the same position at the end of the year as if he then received the stipulated interest  $r$  for £1, neither better nor worse. Now any other value for the amount of £1 in half a year violates this condition; for if we assume that the amount is  $(1+r)^{\frac{1}{2}}+x$ , where  $x$  is either positive or negative, this amount, improved during the second half year, would give  $[(1+r)^{\frac{1}{2}}+x]^2$  as the amount at the end of the year; which cannot be equal to  $1+r$  for any value of  $x$  except  $x=0$ . The interest of

£1 for half a year, deducible from this,  $(1+r)^{\frac{1}{2}} - 1$ , differs but very slightly from  $\frac{r}{2}$ , or half the yearly interest, the first three terms in the development

of  $(1+r)^{\frac{1}{2}}$  being  $1 + \frac{r}{2} - \frac{r^2}{8}$ : it is less than half the yearly interest, which is but equitable; for the borrower is paying money as interest which is not due, according to the terms of the contract, until the close of another half year.

Having thus established  $(1+r)^{\frac{1}{2}}$  as the amount of £1 in half a year, that of  $(1+r)^{\frac{1}{4}}$  in a quarter of a year easily follows; for, as before, if  $1+x$  be employed to represent this amount, we must have

$$1 : 1+x :: 1+x : (1+r)^{\frac{1}{2}}, \text{ or } 1+x = (1+r)^{\frac{1}{4}}.$$

In a similar manner, the amount of £1 at the end of any other fraction of a year which may occur in practice may be shown to be  $(1+r)^p$ ,  $p$  being the fraction of the year.

Now these values of  $(1+r)^{\frac{1}{2}}$  and  $(1+r)^{\frac{1}{4}}$  have been objected to on various grounds. It has been repeatedly said that they involve the theory of incessant conversions, or that the interest of money must be supposed to accrue and to be added to the principal momentarily. I ask if any such assumption appears in the foregoing demonstrations. The earlier writers on interest appear to have uniformly adopted these values, which result from  $(1+r)^n$  as the amount of £1 in  $n$  years, whether  $n$  be a whole number or a fractional one. Dr. Price was the first who dissented from them, and his object in doing so was to obtain results corresponding to practice—he obtained absurd ones. The same facts with which Dr. Price wished to bring his formulæ in accordance, led Mr. Milne, at a later period, to give a different method. We shall therefore briefly state them.

Dividends in the funds and in public companies, interest on mortgages, &c., are usually payable half yearly; and the half yearly dividend, or interest, is one half the yearly; and the interest upon money repaid during a period of conversion is proportional to the portion of the period elapsed.

It must be borne in mind that the period of conversion is that fixed period of time at the end of which interest becomes due according to the contract. If the contract be to pay  $r'$  interest at the end of every half year, the period of conversion is half a year, not a year: what then is the meaning of the term 'yearly interest,' in such cases? A year is the unit of time adopted in financial matters. Incomes, expenses, &c., are referred to this standard; and since the amount of money which goes into the pocket of the lender in each year is of more importance than the times of the year at which he receives it, a more tangible idea is conveyed in the expression "£100 a year, payable half yearly or quarterly," than in "£50 every half year," or "£25 every quarter of a year." The slightest consideration will however show, that the term 'yearly interest' is applied in such cases inaccurately. The yearly interest is what could be obtained from the use of £1 in a year; and if  $1+r'$  could be produced in half a year, can it be denied that at the end of the year this would have accumulated to  $(1+r')^2 = 1 + 2r' + r'^2$ ? The yearly interest would therefore be  $2r' + r'^2$ , not  $2r'$ ; but there is no more scientific propriety in this use of the term than in that of biennial or triennial rate.

Dr. Price gave some theorems to show the increase in the value of annuities certain, when the annuity, instead of being payable at the end of

each year, was payable in half yearly or quarterly instalments. In obtaining the value of annuities payable half yearly, he takes  $1 + \frac{r}{2}$  as the amount of £1 in half a year,  $r$  being what is above called the yearly interest; the value of such an annuity may be found by the same formula, which gives the value of yearly annuities, when properly modified; and the excess of these values above those of yearly annuities, at  $r$  yearly interest, was given by him as the solution of his problem. But there is an evident shifting of the hypothesis in this solution: for if  $1 + \frac{r}{2}$  could be obtained at the end of every half year for £1, it is quite evident that £1 could be made to produce  $\left(1 + \frac{r}{2}\right)^2 = 1 + r + \frac{r^2}{4}$  at the end of a year; and it is therefore with a yearly annuity at the rate  $r + \frac{r^2}{4}$  that he should have compared his results.

The absurd conclusion to which he came was, that although annuities payable by instalments were more valuable on that account, yet that the excess of value diminished when the annuities were for longer than a certain period, and vanished for perpetual annuities. Great men usually have zealous followers, who defend all that has been advanced by them: one of Dr. Price's school states—"The difference, however, between the value of annuities payable yearly and at shorter intervals, is known to be continually lessening, in proportion to the length of the term; till at last, when the term is extended to a perpetuity, those values become the same, whether the payments are made yearly or momentarily."

Mr. Milne, when treating of annuities payable by instalments, avoids Dr. Price's error of shifting the hypothesis from one yearly rate to another, but concludes the interest of £1 for a fraction of a year to be the same fraction of the yearly interest. He arrives at this conclusion in a very summary manner: dividing all interest into simple and compound, and defining compound interest to be the addition of the interest to the principal at the end of the year, he remarks, that until the end of a year compound interest cannot come into operation; that therefore the interest for any fraction of a year must be simple interest, or be the same fraction of the yearly interest. His definitions are manifestly defective, as assuming the question in dispute. The terms 'simple' and 'compound interest' are objectionable, but it is of no use to quarrel with old established names.

Mr. Milne's introduction of discontinuity, in the formula representing the accumulation of money, was attended with its usual consequences of rendering solutions more complicated in some cases, and of increasing the number of problems. These consequences should have caused him to be very careful in making any change, and, as he was leaving the law of mathematical continuity for the sake of a refinement, which, even if correct, could have little or no practical effect, to make sure that the solutions which he gave were in strict accordance with his theory. They are not.

The present value of a sum of money—say, £1—receivable  $n + \frac{1}{2}$  years hence, is the reciprocal of the amount to which it will accumulate in that time;

or, by Mr. Milne's theory,  $\frac{1}{(1+r)^n \left(1 + \frac{r}{2}\right)}$ , which is less than  $\frac{1}{(1+r)^{n+1}}$ ;

and it is for the sake of the difference that Mr. Milne thought proper to give

his new solutions. Instead of the above, however, he employs  $1 + \frac{r}{2}$   $\frac{1}{(1+r)^{n+1}}$ ,

which is greater than  $\frac{1}{(1+r)^{n+1}}$ ; so that, setting out with the intention of lowering the present value of sums, he ends by raising them. The solutions of some of his problems were simplified by this change of formula, and this must have been the inducement for the change; but Mr. Griffith Davies has since given solutions of the problems of life annuities payable by instalments, upon Mr. Milne's principles, which are much more simple than Mr. Milne's, although they are in strict accordance with those principles.

But it may be said, that the allowance of simple interest for fractions of a year is a fact which should be taken account of in solving such problems as depend upon it. Why is it a fact? If the results differ much from equity, which without any question gives  $(1+r)^{\frac{1}{2}}$  as the amount of £1 in half a year, &c., the sooner the legislature and the public are enlightened and custom changed, the better; but in reality the difference is very slight, the results easily calculated, and may be understood by all. "Rough and ready" is the maxim in such cases, a notable example of which is given by Sir R. Peel's rate for the income tax—it is at 7*d.* in the pound, or £2. 18*s.* 4*d.* per cent. It is obvious that 3 per cent. was aimed at, and which would have been obtained from Parliament as easily as £2. 18*s.* 4*d.* per cent.; but perhaps one half of the assessors and payers of the tax would have found a difficulty in calculating 3 per cent. on £187, whilst anyone could tell to how much 187 sevenpences would amount. For the sake, therefore, of this convenience, he sacrificed £140,000 of revenue, and perhaps was wise in so doing. It may moreover be stated confidently, that if customary interest differed much from the true interest, the financiers of public companies could make the custom operate in their favour.

The allowance of simple interest for fractions of a year makes money a little more productive; if therefore investments do not yield simple interest so often as the problems suppose, there will be a further defect in these so called practical solutions. Suppose a Company whose business is to sell annuities payable by quarterly instalments, the values of which are deduced upon the supposition that upon three out of the four annual instalments simple interest will be paid on withdrawing them from investment: the advantage thereby gained, separately small, would upon the whole of the business amount to a sum worth consideration; and, having been allowed to the purchasers of annuities, must be realized by the Company, to avoid loss. Now it is evident that it would not be realized to anything like the extent supposed in the formulæ. The instalments are not withdrawn from investment individually, as in them it is supposed to be; but investments usually remain a considerable number of terms of conversion untouched, and are changed usually at the close of a period. The advantages therefore derivable from the custom of simple interest, which can only arise when investments are withdrawn at other times than the end of a period of conversion, can only be a small proportion of that supposed in the formulæ.

I do not object to the employment of  $1 + \frac{r}{n}$  as the amount of £1 in  $\frac{1}{n}$ th of a year in the solutions of problems, when the employment of  $(1+r)^{\frac{1}{n}}$



would give results troublesome to calculate: higher powers than the first of a small quantity are continually being rejected in mathematical approximations, and its propriety in these problems is proved by our knowledge of the insignificant amount of the error in a sufficient number of cases to warrant an induction to all other cases.

A few words regarding Mr. Sang's tables. It is evident that I believe him to have used the proper expression for the interest of £1 in half a year; but I think, as there were differences of opinion as to what is the proper expression, he should have stated which he had employed: also, that his tables would have been more useful and much more used, if the value of assurances involved in them had been found as payable at the end of the year in which death occurs.

WILLIAM ORCHARD.

## THE RESULTS TO BE LOOKED FOR ON TOSSING A DYNAMICALLY TRUE COIN.

*To the Editor of the Assurance Magazine.*

SIR,—Will you allow me, as a reader of the *Assurance Magazine*, to offer one or two observations with reference to the subject of a paragraph, "on tossing a dynamically true coin," which appeared in the July number of that periodical?

I would remark, in the first place, that it does not appear to me that the terms of the hypothesis are inconsistent. We must, I think, allow it to be theoretically possible that a dynamically true coin, when tossed, *may* turn up head a hundred times successively, although on the other hand it must be admitted that the hypothesis is purely casuistical, and supposes a coincidence of conditions, the probability of the occurrence of which is so small that there is a moral certainty that such coincidence will never actually obtain.

The argument adduced to prove that if a dynamically true coin has been tossed and has turned up head a hundred times successively, the probability of the next throw is in favour of tail, appears to me to be fallacious *ab initio*; for it is an untenable assumption that "in any given number of trials with such a coin, it is probable that the number of heads turned up will equal the number of tails." If *two* trials, for example, are to be made, it is clearly as likely that there will be either two heads or two tails, as that there will be an equal number of heads and tails; and therefore that in this, the most favourable case, there are no odds in favour of the latter result.

The origin of this assumption was probably a hasty deduction from the evidently true proposition, that if a dynamically true coin be tossed a certain number of times, the probability that there will be a given numerical excess of heads over tails is equal to the probability that there will be the same excess of tails over heads. This is true, however small the excess, and therefore when it is zero. The proposition, in this its limit form, has been hastily taken to be—"it is probable that there will be an equal number of heads and tails"; whereas it really is—"it is as probable that there will be the same number of heads and tails, as that there will be the same number of tails and heads." To apply a Johnsonian phrase, this is a conclusion wherein nothing is concluded.

It does not therefore ensue that any reason has been adduced for doubting the accuracy of your statement, that, the coin "being true, one result might be looked for at any time just as much as the other"; but if any one has any impression in favour of the opposite opinion, let me recommend him, before embracing it, to view the question in another light. A hundred and one dynamically true coins are fairly tossed, and then one of them is covered. The others, when examined, are all found to have head uppermost. Is not the hidden coin as likely to have head as tail uppermost?

I am, Sir,

Your obedient Servant,

Royal Military Asylum,  
Chelsea, August 24th, 1853.

W. J. REYNOLDS, B.A.

### THE CHANCES OF PREMATURE DEATH AMONG SELECT LIVES.

*To the Editor of the Assurance Magazine.*

SIR,—As I presume the paper last read at the Institute, in which my name was somewhat frequently referred to, will be inserted in your present Number, perhaps you will allow me to make some comments upon that paper, in order that such readers as were not present at the Institute, may not imagine, that I thereupon became a convert to Mr. Spens' views.

If I understand that gentleman's notions correctly, he seeks to maintain, that for a single year's insurance, the value of selection neutralizes all distinction of age from 21 to 45, and that the *true* premium per cent. for each age alike, is about 10s. 8d., which is the money value of 0.55, when discounted for a year at 3 per cent. I further understand Mr. Spens to maintain that all other ideas are essentially "fabulous," and more especially those set forth in what he is pleased to call my "elaborate treatise 'On the Chances of Premature Death, and the Value of Selection among Assured Lives.'" Mr. Spens, indeed, does not demur to the correctness of the conclusions, as deduced by me; for he expressly says, "*I have not one word to say against these results being correctly deduced from the data on which they are founded; but it is my argument, that they are the correct deductions, reasoning from the data, assuming them to be correct data.*" Is it then, an unfair presumption to consider, that data collected and arranged, under the joint superintendence and responsibility of ten well known actuaries, may at least have some claim for correctness and consideration? It was, indeed, the obvious justness of this claim that induced me to undertake the laborious task referred to.

True it is, that the experience so collected, was of necessity the experience of policies, and therefore not necessarily that of lives; but it had already been tolerably well ascertained, that in moderately large numbers, as a matter of ratio the number of increased deaths, when reckoned by policies, was sufficiently balanced by that of the increased number of policy survivals, when reckoned on the same principle. As an instance of this: Mr. Griffith Davies' well known Table of the Equitable Experience was founded on Mr. William Morgan's statement of policies (*Essay on Rise and Progress*), not upon Mr. Arthur Morgan's experience of Equitable lives; and yet the two tables did not so materially differ as to render Mr. Davies' table

“worthless.” The same analogy of result was equally expected and found, upon due examination, to exist in the policy experience of the 15 combined Offices. Indeed, no unbiassed actuary can calmly compare the town and country, male and female, and British and Irish, policy experiences, with those of the Equitable lives and the Carlisle and Northampton Tables, without admitting the success of the experiment, so far as these identical materials are concerned, as to the fitness of these policy ratios, at least for practical purposes; especially when it is remembered, that even reckoning by lives does not relieve us from the difficulty, that the amounts to be payable upon the deaths of one set of persons, may be very different from those payable upon others, although equal in numbers.

The general mortalities, then, as deduced from the policies so collected, being at least akin to those derived from other tables of mortality, it became a fair presumption, that the mortality during the first calendar year after selection, reckoning by policies, would also, *pro tanto*, shape out a reasonable scale of what might be expected to occur among lives; and the more usefully, because the Equitable experience, of itself, was not sufficiently extensive to determine this more isolated question. That such experience, or perhaps that of any other single Society, should not be held sufficiently authoritative on such a point, was clearly enough indicated, by comparing the relative mortalities for the first and second years of insurance, which, if carefully deduced, could not be reasonably supposed to materially differ from each other, when large numbers were concerned; whereas, relying on the Equitable experience alone, if the mortality during the first calendar year, be thence taken, merely as 0·5 per cent., that for the second must be taken as 1·15, or in the ratio of about 1 to 2·4—a ratio apparently so excessive, as a general rule, between the first and second years of insurance, as not likely to commonly recur, either in the Equitable or any other Society.

But if we take, not merely a part, by excluding the Irish (which is virtually seeking for a minimum), but the *whole* available experience of the 62,014 assurances, including the Equitable, we find 1·0352 as the collective rate of mortality per cent. for the first calendar year after assurance, and 1·4843 for that of the second, or in the ratio of about 1 to 1·4—a much more likely ratio, and one which indicates that the rate deducible from the second year of the Equitable experience, or 1·15, is better as a general type than that of the first. Indeed, the general rates for the first, sixth, eleventh, sixteenth, twenty-first, and twenty-sixth years after insurance, as deducible from the totality of the policy data, will be found (*Life Contingency Tables*, p. x) to be 1·0352, 1·7984, 2·1350, 2·7463, 3·2968, and 3·9992. Considered as a series, these numbers obviously present types of regularity; and thereby strongly inculcate the canon, that however bizarre the experience of a single Society may be, yet that this is often merely an indication, that some other Society may have had an experience, equally bizarre in an opposite direction, and that it is by combination alone that the true average can be indicated.

On examining further how the collective rate of mortality of 1·0352 per cent. for the first calendar year after assurance is made up as to ages, we find the actual rates to have been, for 21 to 30, 0·62184; 31 to 40, 0·74847; 41 to 50, 1·14139; 51 to 60, 2·13132; and 61 to 70, 4·1874—a series, like the former, of considerable regularity, and sufficiently so, to induce us to believe, that the mortality increases from age to age among recently select lives, on the same principles, as it does among lives in general. Moreover, we are to think that such rates, treated specially, cannot be mate-

rially excessive, if we remember that the Carlisle Table is certainly not a very overcharged table, even for the very best lives, and therefore, that any rates much lower than the Carlisle, might be presumed to be verging, rather towards the limit of deficiency than of excess. Now the rates of mortality per cent. for one year, as indicated by the Carlisle Table, for Mr. Spens' terminal ages of 21 and 45, are 0·6946 and 1·4809, and by the Policy Experience Table, for the first calendar year after assurance, 0·5891 and 1·0877, or about 20 per cent. lower at these ages than by the Carlisle Table—a set off for recent selection, at least prominent enough for all practical purposes, considering the avowedly faulty graduation of the Carlisle Table itself.

With such safe and intelligible inferences, then, before us, it may be fairly asked, how it is that the manager of the Scottish Amicable, can yet delude himself into the belief, that Offices in general will be content to disregard all distinction of ages for one year insurances, and be satisfied to consider 10s. 8d. per cent. as the true and only premium for all ages from 21 to 45? Without wishing to be particularly stringent upon the nature of Mr. Spens' own cogitations, we may presume, that he has first been delighted with the ancient paradox of the nullity of age, as to the relative chances of death among healthy lives, and then taxed his ingenuity for modern arguments to defend it. Thus, in his former paper, referred to by himself in support of his views, having in vain attempted to show, even by the limited experience of the Equitable, that the mortality between 21 and 25 is the same as between 41 and 45, he rather naively says, "*Although there is a slight difference in the above in favour of the younger lives, one death more among them, or one death less among the older lives, would have made the proportion almost the same*" (p. 4). The permission, however, to add or subtract a unit at pleasure, when such small numbers as 8 and 10 are in debate, is a logical concession that few could be expected to ask for, and still fewer to grant.

Again: in p. 7 of the same paper the following passage occurs, which is also cited to show that, with Mr. Spens, the preceding is a recognized form of *petitio*:—"While I am quite willing, that this paper should be viewed with the suspicion justly due to the arguments of a party desirous of supporting a particular theory, I will not omit to notice that the limited experience of the Amicable does contradict it; for out of about 224 lives from about 21 to 25, there is 1 death, while among about 500 from about 41 to 45 the deaths are 5. But the disadvantage of the smallness of the numbers, especially in the younger ages, is obvious from this, that one more death among the younger lives would have made the proportion equal." With such an aid as the power of changing, at pleasure, one into two, or of doubling the deaths, what results might not be declared patent?

Further: in his last paper, after having inveighed against the use of policy experience, Mr. Spens does not hesitate himself, to employ the somewhat rougher comparison of merely the sums assured and the amount of claims, without any distinction whatever, either as to lives, policies, numbers, or ages, and thereby arrives (as he conceives by a sufficient process) at his 0·55 per cent. for each age. Partially feeling, however, the intrinsic weakness of such a procedure, Mr. Spens adds: "*It may be asked why I have got the information (as to certain Offices) in reference to the sums assured, and not the individuals. One reason was, that I believed the return could be more easily made; and on the whole, I am inclined to think that no error of any consequence can have arisen, from estimating the rate of mortality in*

*this manner.*" Had an equally wide interpretation been accorded to the reckoning by policies, Mr. Spens would obviously have been obliged to resign his "favourite theory," and your readers have been spared this exposition of the presumed fallacy of it.

It is right however to state, that Mr. Spens does not wholly stand alone in his ideas as to the non-increase of mortality as age progresses. The Government Annuity Table, and the Succession Duty Table which is founded on it, and even the Carlisle Table, present instances of obvious irregularity.

I am too well versed, I hope, in the history of the subject, ever to have stated that the rate of mortality *necessarily* increases with the age; indeed, the following quotation from my work already referred to, will at once protect me from so wide an assertion:—"If the integral rate of mortality were presumed to be equal at all ages, it is obvious the probabilities of surviving any defined period would also be equal at all ages, or the number of survivors would decrease in geometrical progression. It is now, however, generally admitted by actuaries, that the rates of mortality after infancy, and consequently the premiums of assurance, should be graduated so as to increase with the age, although, in nearly all original data, deviations from this presumed increase in the rate of mortality have been observable. These deviations, however, not being of a fixed and determinate character, but differing in different data, have been gradually disregarded in practice, and a conditional augmentation generally adopted." (*Life Contingency Tables*, p. 2.) Those who object to this conditional augmentation, generally do so upon the plea of occasional experience to the contrary; but such a plea, is commonly allied to an experience so limited, as to pourtray, that the upholders of it have not sufficiently distinguished, between a doctrine of certainty, which is not dependent on numbers, and a doctrine of probability which is. In a doctrine of certainty, the same die, thrown one hundred times, and then another hundred, would present in each hundred the same results. So far, however, is this from being the case in a doctrine of probability, that if one die of 100 faces had 99 white and 1 black, and another 98 white and 2 black, it would require a very considerable number of throws, of each die, to establish finally, and then only with a certain degree of probability, which of the two dice, judging from the throws alone, had the greater number of black faces.

Now, to reconcile the admitted increased chances of mortality at extreme old ages with those of youth, the conditional augmentation in the annual ratio of mortality need not exceed upon an average 0.02; or, for 100 deaths at one age, that there should be, out of a similar number of living, 102 at the next. Consequently, when fairly represented as a problem of indirect probability, to distinguish between the mortalities at successive ages as a matter of experience, we must have a sufficient number of trials, to collaterally distinguish between, the throws produced by a die of 9,900 white faces and 100 black, and those of another, having 9,898 white faces and 102 black; so that, having regard to the limited extent of data we really possess which set forth the results of mortality at each successive age, except during childhood, it is only for decennial periods, or such as may be presumed to offer very obvious differences in the rates of mortality, that the actual results of any past experience, can be decisively appealed to, as probable types of the future. But it is obviously in every sense, in the absence of more extensive data for each age, *per se*, a mere gratuitous reversal of analogy, to attempt to

set up, as some have done, the petty irregularities of limited data, as so many declared laws of nature, when, by the very amalgamation of the elements of such data, or by their extension, a simple law of increase is the only one fairly observable.

By adopting, then, this law of increase at great intervals, as a type of what might be expected for lesser intervals, were more extensive experience at hand, we not only protect ourselves from paradoxical triflings, but walk in the steps pointed out by the doctrine of probability itself: for if a series of increasing ratios at wide intervals be presented to us, the most probable interpolations, among the infinity of all the possible ones, are those of a cognate character with the general type of the declared series; and it is to detect what this general type is, that all mathematical formulæ essentially tend. Individually, I should be sorry to rob any healthy senior of the solace he may find in thinking he has an equal chance of surviving to his next birthday as his juniors; but, as an actuary, I consider it is merely attempting to sustain an obsolete paradox to pretend, that such is to be taken as the general attribute, displayed to us by a sufficient experience.

In conclusion, I may be allowed to state, that I have not been content to allow Mr. Spens' paper to pass unnoticed (as I might, I conceive, very safely have done, so far as the argument is concerned), but have rather replied to it at full length, not only as an act of courtesy to that gentleman, whom I personally respect, but also because I feel convinced that, however actuaries may differ in opinion, yet that free and open discussion, without ill feeling and without personal imputations, forms one of the surest indications that the public can possess, that the subject of insurance, in which they all have so deep an interest, is being at once honestly and efficiently studied.

Your obedient Servant,

London, Sept. 1, 1853.

EDWIN JAMES FARREN.

## ON THE VALUES OF REVERSIONS PAYABLE AT THE INSTANT OF DEATH.

*To the Editor of the Assurance Magazine.*

SIR,—I beg to thank you for correcting the errors in my letter published in last *Magazine*, and, through you, to apologize to your readers for the obscurity which they necessarily occasioned in the meaning. I hope you will also allow me this opportunity to extend my observations a little on the subject, lest I should not have been sufficiently understood.

The determination of the value of reversions payable at the *instant* of death may not on first view seem to be an inquiry of much practical utility, since it has never been the practice, so far as I know, to pay claims immediately after proof of death; but the fact that some Offices now do pay claims within a few weeks thereafter, renders a decision on the point the more urgent, and the inquiry more inviting to the actuary, irrespective of the interest which usually accompanies investigations of this kind.

It appears to me, that since *one year* has naturally become the unit for measuring the decrements of human life as well as the improvement of money, the practice has arisen, in life calculations, of assuming the reversion to be payable at the *end* of the year in which death occurs, when the conversion of interest takes place, the same being then due—or, in other words,

*six months* after death; though many Offices have been in the habit of paying claims much earlier. And this circumstance may have led Mr. Sang in his computations to assume it as a fixed principle that money was to yield no more than a given rate per cent. per annum of interest; and that consequently, since the claim was to be paid as soon as death happened, or six months from the date of the last conversion of interest, it became necessary that the last six months' interest, being the interest for the *first half* of the last year, should be *discounted for six months*, the same not being due till the *end* of that year. On this assumption, the discounting of the interest seems to be quite reasonable, in consideration of the advantage which the representative would derive from its improvement until the end of the year; and the assured is therefore entitled to pay a higher premium. If this principle be correct, then Mr. Sang's method of computing the value of the reversion payable at the *instant* of death is in strict accordance therewith, and sufficiently justifies and explains the introduction of the quantity  $\sqrt{1+i}$  into his tables.

Being of opinion that this view is one which can be legitimately maintained, it is unfair in me to characterize his tables as erroneous; and though the opinion expressed in my last communication must be somewhat modified, I cannot think that his principle is the most equitable. I hold it to be more correct in theory, as well as more equitable, to assume the interest to be due *when the claim is due*—that is, *in the middle of the year*; and therefore that a full half year's interest should be paid for the last half year, from the date of the last conversion of interest, at the beginning of the year, to the date of death. The effect of this, of course, will be to diminish slightly the value of the reversion; for while the increased liability on account of interest is admitted, and therefore to be provided for in computing the value, no higher sum than £1 must be assured to be paid.

The value under such conditions is, I think, correctly shown by Mr. Farren to be  $\frac{1-iA}{1+\frac{i}{2}}$ , which may be adapted to suit Mr. Sang's method of

computing by writing it thus (corrected)—

$$\frac{1+i}{1+\frac{i}{2}} \times \left( \frac{vd_x + v^2d_{x+1} + v^3d_{x+2} + \&c.}{l_x} \right) \dots\dots\dots (a);$$

while Mr. Sang's expression for the value—correctly stated, and keeping in view that  $\sqrt{1+i} = \frac{1+i}{\sqrt{1+i}}$ , is

$$\frac{1+i}{\sqrt{1+i}} \times \left( \frac{vd_x + v^2d_{x+1} + v^3d_{x+2} + \&c.}{l_x} \right) \dots\dots\dots (b).$$

It will be observable that these two expressions differ only from one another in the value of their coefficients; the one being to the other as  $\sqrt{1+i}$  to  $1+\frac{i}{2}$ , which, at 3 per cent. interest, will be found to be as 1 to 1.000109, as stated in my last letter. But, in order that the subject may be practically illustrated, and the results thoroughly compared, I send you two sets of tables for insertion, if you can spare room, both having been

computed on the columnar system; whereof Tables I. and II. are based on formula (a), and Tables III. and IV. are copies of Mr. Sang's original tables, and are of course based on formula (b).\*

I considered it unnecessary to occupy your space with the D and N columns in connection with Tables I. and III., since these can be so easily referred to in Jones, pages 291 and 292.

I have only in conclusion to suggest, that it will afford much gratification, to any person who will take the trouble, to verify the values of the reversion as given in Table II., by Mr. Farren's formula; but, in order to insure a close and satisfactory approximation, the annuity should be taken from Gray's Assurance and Annuity Tables, or from Thomson's Actuarial Tables, where the value of A is given to five decimal places. Mr. Sang's reversion may also be verified in a similar manner, by dividing by  $\sqrt{1+i}$ .

DAVID CHISHOLM.

North British Insurance Office,  
Edinburgh.

### THE INTEREST QUESTION.

To the Editor of the Assurance Magazine.

SIR,—In your last Number, a Mr. Filipowski asks a well known writer how he would, according to his own plan, solve the following problem:  $s$  = sum;  $d$  = rate of interest;  $a$  = amount;  $x$  = period or duration. In what time will the sum  $s$  amount to  $a$ , at compound interest? As it is not to be expected that the writer referred to will formally reply to so simple a question, perhaps, as a young Associate of the Institute of Actuaries, I may be allowed to point out to Mr. Filipowski, who appears from his name and style to be a foreigner, that all our English elementary treatises on algebra touch on compound interest, and demonstrate that, if  $s(1+d)^x$  is to equal  $a$ , that  $x$ , as a period or duration, will equal the logarithm of  $a$  divided by the logarithm of  $s(1+d)$ . I may also direct Mr. Filipowski's attention to a work published in 1816, entitled *Investigation of the Errors of all Writers on Annuities, in their valuation of half yearly and quarterly payments, &c., &c.*; by Wm. Rouse. Mr. Rouse, like Mr. Filipowski, takes up the old notion of D'Alembert, embodied by Mr. Smart in his tables, of using the geometrical mean of  $(1+d)^{\frac{1}{2}}$  between 1 and  $(1+d)$ , instead of the arithmetical mean of  $\left(1 + \frac{d}{2}\right)$ , as in common use; but as the notions expressed by the two cases are very different in theory, Mr. Corbaux has pointedly said, in his *Doctrine of Compound Interest*, p. 64, "This writer has taken great pains merely to prove truisms." Accordingly, all the best modern interest tables, like those of Mr. Peter Hardy and Mr. Rance, are framed for half yearly and quarterly interest on the same formulæ as those of Corbaux, and not upon the antiquated ones of D'Alembert and Smart, so severely criticised by Mr. Milne and the writer in the *Penny Cyclopædia*.

Yours respectfully,

A YOUNG ASSOCIATE.

\* See "Original Tables," pp. 89—92.



# ON THE SETTLEMENT OF LOSSES BY FIRE UNDER AVERAGE POLICIES.

*To the Editor of the Assurance Magazine.*

SIR,—I have read the article in No. X. of this *Magazine*, "On the Settlement of Losses by Fire under Average Policies," by Richard Atkins, Esq., with the greatest interest; and as the author refers to the German forms of the conditions of policies, I beg leave to communicate to you a case which in some respects bears upon the question, and which gave rise to a difference of opinion amongst the managers of the German Fire Insurance Offices as to the just distribution of the claims. To facilitate the understanding of the cases, I have changed the sums in such a way that they allow simple calculation.

A merchant has taken out two policies—in Office A, £2,200, for grains, seeds, and mats, in a named warehouse; and in Office B, £1,800, for grains and seeds in the same warehouse. An accident happened, and it was proved that the stocks in the warehouse at the moment of the fire had been—

Grains and seeds	£. 4,000	Loss, valued at 25 per cent.	£. 1,000
Mats	400	" " 50 "	200
Grains, seeds, and mats	£4,400	Loss, 27 $\frac{2}{3}$ per cent.	£1,200

I had to make up the distribution of claims, and did it in the following way. The sums insured do not exceed the value of the stock existing at the time of the fire.

Office A	£. 2,200	on grains, seeds, and mats, pays 27 $\frac{2}{3}$ per cent.	£. 600
Office B	1,800	on grains and seeds, pays 25 per cent.	450
Uninsured	400	loses	150
	£4,400		£1,200

The party assured did not agree with this distribution, and made up the following:—

Grains and seeds—		£.		£.	s.	d.
Insured with Office B		1,800	pays 25 per cent.	450	0	0
$\frac{1}{3}$ of the sum uninsured		180	" 25 "	45	0	0
Office A, £2,200	Proportion, £2,420: £2,020	1,837	" 25 "	459	0	0
$\frac{2}{3}$ uninsured, 220		183	" 25 "	46	0	0
		£4,000		£1,000	0	0

For mats—

Office A	£2,200	Proportion, £2,420: £400	£367	" 50 "	£183	10	0
Uninsured	220		33	" 50 "	16	10	0
			£400		£200	0	0

That makes, for Office A  $\left\{ \begin{array}{l} £459 \ 0 \ 0 \\ £183 \ 10 \ 0 \end{array} \right\}$  £642 10 0 a difference of £42. 10s.  
 " " Office B ..... 450 0 0 there is no difference.

Uninsured	£. s. d.	
$\left\{ \begin{array}{l} 45 \ 0 \ 0 \\ 46 \ 0 \ 0 \\ 16 \ 10 \ 0 \end{array} \right\}$		107 10 0
		£1,200 0 0

I must note here, that the insurance which I represent as made with Office A had been made with two different Offices—the Fire Insurance Bank in Gotha, and the Assicurazioni Generali, in Trieste, for which I am acting. The policies being of the same tenor, it will not affect our judgment if we consider them both effected with Office A, thus simplifying the case; but I was obliged to mention it, for the Gotha Bank declared the distribution of the assured to be correct, and mine to be erroneous. The argument given by the Gotha Bank is, that the sum uninsured ought to be divided among grains and seeds and mats, in proportion to the existing stock, as it is done by the assured.

My arguments for my settlement of the claims are: 1, it is quite evident that, if no other policy were existing but the £2,200 with the Office A, the loss to be paid would be £600, and I cannot find any reason in the conditions why I should be obliged to pay more through the co-existence of other policies; 2, I have insured on grain, seeds, and mats (that means, on all goods in the named warehouse) in one undivided sum; and therefore I pay in one undivided sum proportionate to the sum insured, at the ratio of the entire loss to the amount of all the goods: 3, there is no reason to divide the sum *uninsured* for grains, seeds, and mats in proportion to the existing stock, for, since there was insured with Office A £2,200 for grains, seeds, and mats, the statement would be—

	£.		£.
Office A—For grains and seeds .....	2,000	Mats .....	200
Office B— " " .....	1,800	" .....	0
Leaving uninsured .....	200	" .....	200

I stated the case to the managers of the different German Fire Offices, and requested their opinion. I do not know whether I have permission to publish the opinions I got. Up to this moment, six Offices have agreed with me, one with the Gotha Bank and the assured, and one gives a third mode of distribution, which you will allow me to communicate.

	£.	s.	d.		£.	s.	d.
Office B, having assured	1,800	0	0	pays 25 per cent. ....	450	0	0
Office A, " "	2,200	0	0	" 28 $\frac{1}{4}$ " .....	634	10	0
Uninsured .....	400	0	0	loses 28 $\frac{1}{4}$ " .....	115	10	0
	£1,200	0	0		£1,200	0	0

In this example the differences between the three modes of distribution are of small importance; but I could easily give such numbers as would prove the divergence of the adopted principles. I mean to say, that there exists no condition of the policy that obliges me to pay a *larger* sum, because other policies have been co-existent, than I should have paid under the same circumstances had no other policy been taken out. And it would be very dangerous to agree to principles contrary to those which I have stated as mine: for an Office, A, having included in the policy the risk of more dangerous objects forming the contents of a large establishment, in regard that the value of these was small compared with the whole amount insured, would be considered to have *chiefly* insured these more dangerous objects, if the other Offices insuring the same establishment had omitted these objects in their policies; for then, according to the mode of distribution adopted by my opponents, if an accident had destroyed the dangerous objects and but little injured the rest, they would make out that the loss should be paid by those Offices which did not name the dangerous objects,

and would then request Office A to pay the proportionate part of the *remaining* loss to the *remaining* value.

I remember some cases of this kind which occurred here at Hamburg, and then the claims were settled according to the principle which I maintain.

I am, Sir,

Your obedient Servant;

Hamburg, 23 April, 1853.

WILHELM LAZARUS.

## REVIEWS OF NEW WORKS.

*Annals, Anecdotes, and Legends: a Chronicle of Life Assurance.* By JOHN FRANCIS, author of *The History of the Bank of England*, &c. London: 1853.

THE art of book-making may be a cheering art enough for those "who pen to profit," but it is a sorry affair for those "who pay to peruse." Mr. Francis, moreover, is a perfect wholesale dealer in such matters, and fills sheet after sheet with astonishing facility; and yet, some of our daily, weekly, and monthly contemporaries have been unkind enough to say, that Mr. Francis is ignorant of assurance matters! This, indeed, is taking an opposite view; for, although we ourselves have devoted years of practical attention to such topics, yet we at once frankly confess, that we have met in Mr. Francis' book with matters of which we were, previously, perfectly unconscious. We had imagined that insurance was but a prosaic affair—that Companies received premiums, put them out at interest, and when they had to pay away more than they had received in a transaction, lost by it; and when less, gained by it; and that it was in the final balancing of these losses and gains, that the whole mystery of the matter lay. Whereas, under Mr. Francis' hands, insurance is merely an affair of the *belles lettres*: for ballads might be very easily written on his chapters, containing, as we learn from his table of contents, the episodes of "*Janus Weathercock*," "*The Banker's Mistress*," and "*Young Mr. Pigot and Old Mr. Pigot*"; while *Mélodrame* scowls and quirks from under every line of his text on "*the Murdered Merchant*," "*the Unburied Buried*," and "*the Night Adventure*." Nay, Melpomene herself does not escape; for we are timely forewarned by the preface, that "*the many legends and traditions of the subject form a page from the romance of Mammon, which, remarkable as some of the stories may appear, and fearful as many of them are, form but a small portion of the sad and stern realities attached to the annals of life assurance*"; and are threatened, still earlier, by the mottoes of the title-page, vamped out from Sir E. B. Lytton and Mr. W. Shakspeare, telling us that "*tragedy never quits the world*," and that we are to expect

"Murder—

*Murder most foul, as in the best it is;*

*But this most foul, strange, and unnatural."*

It is true, the Parliamentary Committee on Life Assurance Associations, in their recent Report, hint at the incorporation of actuaries as a professional body, and of their being distinguished by diplomas and certificates of qualification to practise as actuaries; but who, except Mr. Francis—himself,

i is true, no actuary—ever dreamt of mixing up, the attributes of the poet laureate and the licenser of plays among the qualifications of the candidates, merely to appreciate such gems of the literature of life assurance! If Mr. Francis, in his ignorance of the plain prose of financial topics, will turn poetical and melodramatic, we do earnestly beg of him, that he will henceforth look out for more suitable subjects. We have no objection to his dealing in his own manner with “the Bank of England,” “the English Railway,” and “the Stock Exchange,” highly poetical topics as he has endeavoured to prove these to be; but let us in mercy have no more such *Annals*, *Anecdotes*, and *Legends of Life Assurance*. With about 200 Insurance Offices *in esse*, and as many *in posse*, their prospectuses, their reports, and other announcements, it is a perfect waste of Mr. Francis’ lucubrations, to employ them on a subject, already so well anointed with all the unction, that ingenious palaver can administer. It is not, that we in the least doubt Mr. Francis’ qualifications for the latter part of the task, or of his not obtaining efficient assistance; for we trace in many parts of his present book, passages which, if inserted in the daily papers, would at once have to be headed by the phylactery of “advertisement”; but, from not being sufficiently initiated into the general bearings of the subject, he is unwittingly betrayed into such egregious errors, as cease to render, his annals chronological, his anecdotes amusing, or his so called legends even possibly credible.

As an experiment, of how to waste eight shillings, the purchase of Mr. Francis’ book will be found to be perfect.

*An Investigation of the Deaths in the Standard Assurance Company.*  
By Dr. ROBERT CHRISTISON.

*Medical Statistics of Life Assurance—Observations on the Causes of Death among the Assured of the Scottish Widows’ Fund and Life Assurance Society, from 1846 to 1852.* By Dr. JAMES BEGBIE.

THERE is nothing connected with life assurance business so unsatisfactory as the painful necessity under which directors of Life Offices feel constrained frequently to refuse the proposals of individuals who are, unconsciously to themselves personally, ineligible lives, or who, from family history, are considered so predisposed to certain diseases as to be inadmissible along with those who have no such disadvantages. This evil has been doubtless alleviated by the establishment of Companies who professedly engage to undertake such risks on reasonable terms. Still the data on which they may found their rates are very defective; and we fear it will be a long time before the experience of such Offices, in itself, will be sufficiently extensive to enable a fair premium to be paid for every life. While so little can be gathered from the experience of these new Offices, they, as well as the ordinary Offices, must hail as a great boon any well authenticated statistics among the latter. The assurance world and the public generally are deeply indebted to the talented and experienced medical officers of the Scottish Widows’ Fund and Standard Life Offices, for the very valuable contributions which appear in the *Monthly Journal of Medical Science* for August, on the subject of the mortality in these two Offices, who have so liberally authorized their publication.

We should here notice, that it is to Dr. Begbie we are indebted for the

introduction of these papers, which must prove so useful, the first paper of the kind having appeared in the *Monthly Journal of Medical Science* for January, 1847, on the subject of the mortality in the Scottish Widows' Fund Life Office up to the end of 1845. Besides the importance which would naturally attach to the observations on the returns of his own Office, Dr. Begbie states he was induced to commence these papers in the hope that others, who were, like himself, "placed in the responsible situation of advisers of such institutions in the selection of lives, might be led to take an interest in the subject, and aid in the collection of such statistical facts as might prove of value, not only in guiding the medical advisers of Life Assurance Societies generally, but in affording instruction to all who take an interest in pathological researches, or who seek the promotion of medical science." In this hope he has not been disappointed; and while the subject has attracted attention in other quarters, his labours have been ably succeeded by Dr. Christison, the well known Professor of *Materia Medica* in the University of Edinburgh.

The papers contain minute and elaborate details in reference to the causes of death; and the discussions as to how far greater experience in the rules of selection would have mitigated the losses, will be found of great advantage to the medical advisers of the numerous ordinary Offices, in determining what may be considered ineligible risks; but, as will be seen from what we have said above, we value them still more, as tending to elucidate the rules which may enable every life to be adopted at a just premium, and deprive the noble and Christian system of life assurance of its most distressing feature. One of the points touched on in both of the papers is the question how far the appearance of consumption in an applicant's family, without any evidence of personal delicacy in himself, should influence the consideration of the proposal. That such a disease is in many cases hereditary, there can be no question; and it appears to some extent among the immediate relatives of so many, that no Office has, we believe, ever acted up to the principle of refusing every application where consumption has exhibited itself in a family. In the case of the two Offices whose mortality is the subject of the papers to which we are referring, it would seem that, at all events in the case of applicants under middle age, the death of two members of the family from consumption operates as a barrier to the acceptance of the life. An arbitrary rule like this, however, is very unsatisfactory; and while we could see much reason, if it were practicable, in rejecting every case where any symptom of consumption had appeared in a family, in the absence of such a rigid rule we could suppose many cases where two deaths from consumption had occurred, which might be worthy of consideration. Perhaps however the rule, though general, may not be universal. Dr. Begbie evidently attributes the smaller proportion of deaths from consumption in the period from 1846 to 1852, as compared with that in the period prior to 1848, as greatly owing to the adoption of this rule: but in the first place, the observations of 1847 appear only to show one case out of those there remarked upon which this rule would have saved; and in contrasting in this present paper 12 deaths only, from age 30 to 40, out of a larger general mortality, with 35 before, he omits to notice that there is a considerably less general mortality at the particular ages in the record of the last seven years; and, so far as we can see, the probability seems to be that the most of these 12 deaths occurred among the recent admissions, and few before the rule was adopted. At all events, 9 of these took place within six years of

effecting the insurance. Out of the whole 42, it seems that 17 deaths took place within five years of effecting the insurance, and 11 others between five and ten years. We have no means of estimating what proportion of the whole 690 deaths had occurred out of assurances effected during the last septennial period, but they are not likely to have materially exceeded 150; and it does not seem probable that the proportion of deaths from consumption among the deaths arising out of the entries during that period can be greatly less than the ratio of 11 per cent., exhibited under the analysis of the mortality prior to 1848. Of course these figures may be very erroneous; but what we have said will tend to show that it would be desirable to have the information here guessed at before a legitimate inference could be made of the value of the rule referred to, by a contrast of the relative mortality from consumption during the two periods; and besides, there must also be taken into account what improvement may have resulted from a more careful attention to any symptoms of personal delicacy.

In reference again to the deaths among the assurances effected prior to the last septennial period: if the above suppositions be at all correct, the total deaths being 690, if 150 be deducted there would remain 540 of deaths among these assurances; and of the whole 42 deaths from consumption, it does not seem very likely that there should be more than 27, or 5 per cent., out of the 540. It seems also probable, from the average time assured of 29 lives fallen by consumption in the Standard Life Office during the quinquennial period reported on by Dr. Christison, being only five years, that not many of the deaths have occurred among assurances of any considerable duration. It is not very easy to account for such an apparently small proportion of deaths from consumption among the more early assured on any other assumption than that the deaths from consumption at older ages, among the general population, take place either among lives which from an early period would have been considered ineligible for assurance, or among those classes of the community who do not assure their lives. We do not pretend, however, to explain these anomalies satisfactorily, and may have misapprehended some of the statements in the papers; but there is no doubt it is very desirable to have as full information as possible on the grounds for reliance on the propriety of rules for the rejection of applications on reasons irrespective of the personal condition of the individuals, though we fear such cause may be unavoidable in the present imperfect state of our information.

Our space will not at present permit us to enter farther on the subject of these interesting papers, of whose great value and importance our remarks, we are sensible, can have given but a very inadequate idea; and it cannot require any recommendation of ours to insure an attentive perusal of them by all engaged in the business of life assurance.

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*The New Supplies of Gold: Facts and Statements relative to their actual Amount, and their present and probable Effects.* Revised Edition, with five additional Chapters. By WILLIAM NEWMARCH. London: Pelham Richardson, 23, Cornhill. 1853.

WE notice this work, as being the production of a gentleman who is *de facto* an actuary—as being also on one of that class of subjects which we hold that gentlemen of that profession are peculiarly fitted to investigate, and as developing with remarkable ability some of the curious and interest-

ing questions connected with this intricate branch of politico-economical science. In such inquiries as these it is difficult to be too circumspect. Mr. Newmarch wisely says—"The temptation is strong and constant, to raise upon an imperfect knowledge of what has really happened, ingenious and plausible theories of what is likely to occur; and there have been instances already of the confusion and error arising from this inversion of the order of inquiry. We shall be quite content if we succeed to some extent in applying to the large and vital questions connected with the new supplies of gold, a method of investigation, not perhaps so attractive as might be desired, but at all events in unison with those rules of philosophy which enjoin upon us the necessity of patient and thorough observation, before we resort to abstraction and generalization."

It is one of the great merits of the work, that these principles are acted upon to the letter. The author first collects from the best authenticated sources all the facts which are needed in his arguments, carefully scrutinizing them, and rejecting or giving no more than its due weight to whatever cannot be well established; and, guided by these, brings out, with due reserve and caution, most important and interesting generalizations. We must refer the reader for these to the treatise itself; but we find room for the following amongst many similarly well reasoned passages:—"Evidence furnished in the previous portions of this paper, and the personal knowledge and observation of nearly everyone, leave no room to doubt the vast and extraordinary increase which has taken place in every branch of industry in this country during the last three years. There has been, in particular, a great increase of transactions in those branches of retail and local trade in which the intervention of a circulating medium is most required. The money transactions of the working and poorer classes have augmented both in number and in amount. It is impossible to prove, but there is strong reason to believe, that the expansion both of the coin and paper circulation has arisen gradually but mainly from these causes. The increased quantities of coin and paper have, as a matter of fact, *not* been placed or thrown upon the market, and thereby led to greater activity in trade, and to higher prices and wages. On the contrary, the increase in the quantity of the circulation has gradually grown out of the increase in the activity of trade. Brisk markets for British goods in Australia, America, India, or Europe, first provided full employment for the working classes at former rates of wages. The expenditure of those wages stimulated the requirements for a circulating medium in the retail trades of the country. Emigration, adding its effects to those of expanding markets, then led to a rise in the price of labour; and the weekly demand for larger quantities of coin and notes, necessary for the payment of higher wages, and for the circulation of the commodities in the purchase of which those higher wages were expended, has naturally rendered the former amount of circulation inadequate to the present business of the country. In short, the increased amount of coin and paper circulation has been *drawn* out, not *put* out. It is emphatically an effect, and not a cause."

In the truth and good sense of these observations we heartily concur; and indeed it is scarcely possible to do otherwise, as regards most of Mr. Newmarch's deductions. It has, however, struck us, that in commenting on the vast development which the energies of the country are now experiencing, he attaches scarcely sufficient importance to the changes made of late years in our commercial system, and to the enormous demand for our manufactures

which have resulted from them. As a very trifling blemish, too, in so admirable a production, we notice, with a view to its being expunged in future editions—for it sometimes obscures the sense—the curious system of punctuation which runs more or less throughout it. The two passages we have quoted, particularly the latter, afford several instances of this peculiarity.

*Works recently published:—*

Census of Great Britain, 1851. Population Tables I. Numbers of the Inhabitants in the Years 1801, 1811, 1821, 1831, 1841, and 1851. Two vols., and Index to the Names of the Parishes, Townships, and Places in the Population Tables of Great Britain. Presented to both Houses of Parliament by Command of Her Majesty. London: Printed by W. Clowes & Sons, Stamford Street and Charing Cross, for Her Majesty's Stationery Office. 1852.

Statistical Reports on the Sickness, Mortality, and Invaliding among the Troops in the United Kingdom, the Mediterranean, and British America. Prepared from the Records of the Army Medical Department and War Office Returns. Presented to both Houses of Parliament by Command of Her Majesty. London: Printed by W. Clowes & Sons, Stamford Street and Charing Cross, for Her Majesty's Stationery Office. 1853.

Life Assurance viewed as a Profitable Investment; with Remarks on the System and Practice of several Offices, and Tables in illustration. By Robert Henry Menzies. Prescot: Printed and published by J. Culshaw, Market Place. 1853.

## REPORTS OF ASSURANCE COMPANIES.

*Gresham Life Assurance Company.—Fourth Annual Meeting, held October, 1852.*—The report states that within the year 525 new policies have been granted, assuring £268,283, and producing annual premiums of £9,421. 19s. These amounts greatly exceed those of any former year, and, as compared with the transactions of 1850–1, manifest an increase of upwards of £100,000 in the sum assured, and of more than £4,000 in the receipts from premiums. It is also highly satisfactory to state that the assurances are principally on the first class English lives. In the declined lives branch, the selection has been such as to carry out the original principles of that department.

In this Office, the circumstances of every individual case determine the rate of premium where the risk is increased, and the additional charge is reduced, or entirely removed, as the health improves.

The deaths within the past twelve months have been considerably below the calculated mortality, nine policies only having become claims, amounting in the whole to £2,789. A very large proportion of this sum is covered by the receipts under assurances, lapsed or terminated within the year.

In the loan department—

	£.	s.	d.
The aggregate sum advanced on security to policyholders, from			
July, 1848, to July, 1852, has been	70,441	16	8
Amount repaid	30,531	0	0

Amount outstanding . . . . . £39,910 16 8



The safety and advantage of thus employing the resources of the Office bear the test of experience, as up to the end of the fourth year no losses have been ascertained.

The satisfactory progress of the Office from year to year is seen by the following table:—

Dates.	Policies issued.	Sums assured.			Premiums receivable.			Amount out at Interest.		
		£.	s.	d.	£.	s.	d.	£.	s.	d.
July, 1849	419	149,160	16	0	5,615	11	8	7,455	15	0
" 1850	920	368,201	7	0	13,896	13	9	18,172	17	2
" 1851	1374	532,855	2	0	19,020	17	1	25,331	18	5
" 1852	1899	801,138	3	0	28,442	16	1	30,910	16	8

The total number of policies issued from the year 1848 up to July, 1852, is 1,899, assuring £801,138. 3s., at the aggregate annual premium of £28,442. 16s. 1d. The total number remaining in force at the close of the fourth year was 1,433, assuring £595,345. 3s. for the whole of life and deferred periods, from which annual premiums were receivable amounting to £21,320. 14s. 2d.

The capital employed in the loan department has increased in three years from £7,454. 15s. to £39,910. 16s. 8d.

The income of the Society at the date referred to may be thus estimated:—

	£.	s.	d.
From premiums . . . . .	21,320	14	2
From interest on the accumulated capital, at 5 per cent. . . . .	£1,995	10	0
Less, say $\frac{1}{4}$ per cent. for contingencies . . . . .	199	11	0
	<hr/>		
	1,795	19	0
Total estimated income . . . . .	£23,116	13	2

In consequence of the progress of the Society having been more rapid than the projectors anticipated, the directors have caused a careful valuation of the Society's assets and liabilities to be prepared by the actuary. This with an Assurance Company is a laborious task, and was not contemplated to be done before the seventh year, when the division of profits will take place; but looking to the magnitude and nature of the interests at stake, the directors considered that they were justified in incurring the expense at an earlier period: and they now present the following reports from Mr. Jenkin Jones, the Society's consulting actuary, Peter Hardy, Esq., F.R.S., actuary to the Corporation of the London Assurance Company, and Robert Tucker, Esq., actuary to the Pelican Insurance Company.

*To the Chairman and Directors of the Gresham Life Assurance Society.*

Gentlemen,—The following valuation has been made upon data supplied to me by your secretary, from the Office records; and instructions were given by me, in all cases of extra risks to state the age of the assured at the increased age at which the premiums for such risks have been charged, and I am assured by the secretary that this has been done in every instance.

Although my instructions only extend to the valuation of your liabilities, and of the full annual premiums chargeable upon the assurances effected, I venture to recommend to your serious consideration the expediency of discontinuing granting immediate annuities, as you have already more than sufficient capital and funds in hand than will be required to meet your

claims, and the experience of all the older Offices has proved that annuity business cannot be transacted with much, if any, profit; and you will find, with your rapidly increasing income, that the time is not far distant, when it will be difficult to invest your funds upon eligible securities yielding a larger interest than can be obtained by the public funds.

JENKIN JONES, *Actuary.*

<i>Dr.</i>		
To present value of £595,345. 3s., assured for the whole of life and deferred periods . . . . .	£.	s. d.
Paid up capital . . . . .	238,875	18 1
Sundry deposits at call . . . . .	18,229	0 0
Sundry outstanding claims, by death, salaries, stationery, accounts, rents, and law charges . . . . .	4,750	9 0
Amount to be reserved for £2,600, endowment assurances . . . . .	930	10 11
Amount to be reserved for short period assurances and deferred annuities . . . . .	215	16 9
Amount to be reserved for £864. 8s. 1d. per annum, immediate annuities . . . . .	131	5 1
Balance . . . . .	6,249	8 9
	74,477	17 7
Total . . . . .	£343,859	17 2
<i>Cr.</i>		
Present value of £21,320. 14s. 2d., annual premiums charged for £595,345. 3s. assured for the whole of life and deferred periods . . . . .	294,197	15 4
Assets on 31st July, 1852 . . . . .	49,662	1 10
Total . . . . .	£343,859	17 2

*To the Chairman and Directors of the Gresham Life Assurance Society.*

Gentlemen,—The above statement, and the data upon which the results have been obtained, have been submitted to us to report our opinion thereon. The amount stated as assets, capital paid up, and outstanding claims, we have taken for granted, they being respectively as furnished by Mr. T. A. Pott, your secretary. The calculations made by Mr. Jenkin Jones in respect to the value of your liabilities under the sums assured and the annual premiums receivable thereon have been carefully checked by us in duplicate; and we certify that the results set forth are strictly accurate. The valuation has been made, as regards life assurance, upon the “Combined Experience” rate of mortality and interest assumed at the rate of  $3\frac{1}{2}$  per cent., and the annual premiums have been taken as charged by the Office. Mr. Jones has made an ample reserve for endowments and deferred annuities, having appropriated for these purposes the amount of the sums annually received, compounded at  $3\frac{1}{2}$  per cent. interest.

The immediate annuities Mr. Jones has valued by the Carlisle rate of mortality, at  $3\frac{1}{2}$  per cent. interest; and looking to the amount of assets in hand, and the large annual income which you now have, we concur with Mr. Jones, for the reasons assigned by him, in recommending you not to grant any further annuities.

The only item in the balance-sheet to which Mr. Jones and ourselves think it necessary to draw your attention is to the balance of £74,477. 17s. 7d., which is to be looked at, not as a realized and divisible surplus, but as the fund out of which future profits are to be appropriated, and out of which the proportion of future expenses are to be paid.

We have the honour to be, gentlemen, your obedient servants,

PETER HARDY, “London Assurance.”

ROBERT TUCKER, “Pelican Life Insurance Office.”

*Income and Expenditure for the year ending 31st July, 1852.*

<i>Dr.</i>	£.	s.	d.	£.	s.	d.
Balance at bankers, brought forward . . . . .	2,093	17	0			
„ of petty cash . . . . .	121	2	2			
„ in agents' hands . . . . .	1,831	13	11			
„ of bills of short date . . . . .	8	11	11			
Half premiums on credit . . . . .	959	4	9			
Balance of stamp account . . . . .	63	0	3			
				5,077	10	0
Capital stock received this year . . . . .				6,097	0	0
Premiums (including £8,319. 1s. 11d. for new assurances) . . . . .	21,348	14	0			
Premiums (arrears due in town department, July 31, 1852) . . . . .	569	4	0			
				21,917	18	0
Annuities, purchase of . . . . .				2,635	14	10
Loans repaid the Society . . . . .				11,871	1	9
Interest (received on this account) . . . . .	1,223	0	10			
„ (arrears due 31st July, 1852) . . . . .	329	2	0			
				1,552	2	10
Loan guarantee fund . . . . .				140	14	6
Fire insurance . . . . .				0	9	0
Total . . . . .				£49,292	10	11

*Cr.*

	£.	s.	d.
Preliminary expenses (carried to suspense account, pursuant to deed of settlement), comprising repairs and alteration of strong room, fittings, and office furniture; also, expenses of opening new agencies and extending Society's operations in various parts of the United Kingdom, including travelling expenses, printing, stationery, postage, and carriage . . . . .	1,062	16	7

Expenses of management:—

Office expenses, rent, rates, coals, gas, and sundries . . . . .	£371	14	5			
Printing and stationery . . . . .	143	16	11			
Postage and carriage . . . . .	89	3	0			
Salaries (including directors' and auditors' remuneration) . . . . .	2,303	7	8			
				2,908	2	0
Commission and advertising . . . . .				1,846	10	9
Medical fees, for examinations and reports . . . . .				533	18	2
Repaid sundry depositors . . . . .				1,600	0	0
Paid annuitants . . . . .				615	5	6
„ claims (including £925 outstanding last year) . . . . .				2,823	0	0
„ interest and dividends to shareholders . . . . .				1,015	11	9
„ reassurances . . . . .				2,260	9	0
„ fire insurance . . . . .				0	9	0
Advanced on various securities this year . . . . .	26,450	0	0			
Interest due July 31, 1852 . . . . .	329	0	0			
Half premiums on credit . . . . .	1,510	5	9			
Premiums (town department) due July 31, 1852 . . . . .	569	4	0			
Bills of short date in office . . . . .	511	19	5			
Balance in agents' hands . . . . .	1,908	0	1			
„ of petty cash in secretary's hands . . . . .	78	4	4			
„ of cash at bankers . . . . .	3,228	16	8			
„ of stamp account in secretary's hands . . . . .	40	16	0			
				34,626	8	2
Total . . . . .				£49,292	10	11

The sum of 50 guineas was voted to the four auditors.

*Hope Mutual Life and Honesty Guarantee Society (1852).—Extraordinary General Meeting, held July 21st, 1852.*—The meeting was convened to consider the propriety of adding two directors to the board, at present limited to ten directors by their deed of settlement. In the course of his address, the chairman stated that the call of £1 per share had already amounted to £5,035 paid in to the Society's bankers, and the greater part of that sum had been employed in the purchase of India bonds; and that interest at 5 per cent. would be calculated up to 25th December next, and for the future on 24th June and 25th December, and payable on 1st July and 1st January in each year. That the first meeting of the board after complete registration had been effected, took place on the 23rd April last, and in the three months since elapsed they had appointed 652 first class medical advisers over the United Kingdom of Great Britain and Ireland, and established 255 local and provincial agents. 131 proposals for assurance, for sums amounting to £28,950, had been received, of which 70 had been completed.

*Householders' and General Life Assurance Company (1852).—First Annual Meeting, held 8th March, 1853.*—The report stated that from the 10th March, 1852, the day when the certificate of complete registration was granted, the directors had received 550 proposals, to assure the sum of £113,289. Of these, 411 have resulted in policies, assuring the sum of £77,264, and producing an annual income of £3,200. The directors have appointed nearly 200 agents in London and the provinces, and received assurances of co-operation and support from nearly 400 medical men; and they refer to the principles of the Society in the establishment of the assurance loan system, and in its combination with the savings' bank assurance system.

*The Industrial and General Life Assurance and Deposit Company (1849).—First Annual General Meeting, held 3rd of April, 1851.*—The report stated that, from the commencement of business, on the 26th February, 1850, to the close of the financial year, on the 13th February, 1851, 1,218 policies, for sums exceeding £103,000, had been granted, at premiums of £3,475. 2s. 11d. per annum.

The progress has been as under:—

	No. of Policies completed.	Sum assured.	Annual Premium.
		£. s. d.	£. s. d.
From the commencement of business, on the 26th of February, to 14th May, 1850, both inclusive	145	13,276 17 0	444 12 11
From 15th May to 13th August, 1850, both inclusive	202	16,678 16 8	553 17 10
From 14th August to 12th November, 1850, both inclusive	348	29,652 13 3	1,035 1 6
From the 13th November, 1850, to 11th February, 1851, both inclusive	523	44,108 17 10	1,441 10 8
Total in the First Year	1,218	103,717 4 9	3,475 2 11

The directors also report, that out of 40,000 shares, forming the capital stock of the Company, 18,160 had, at the close of the financial year, been subscribed for. The balance-sheet includes the whole of the provisional charges from the 2nd August to complete registration on the 29th December, 1849, and also the sum of £500 paid to the promoter pursuant to the deed of settlement. Two losses by death had occurred, one of which, amounting to £200, was incurred during the past year; the other, amounting to £17, more recently. A dividend was declared after the rate of £5 per cent. per annum, to the 31st December last, on the amount paid up on account of shares.

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## INSTITUTE OF ACTUARIES.

### PROCEEDINGS OF THE INSTITUTE.

*Eighth Ordinary Meeting, Session 1852-53.—Monday, 27th June, 1853.*

JOHN FINLAISON, Esq., President, in the Chair.

The Minutes of the last Meeting having been read and confirmed, the Secretary announced various donations to the Library.

The following Candidates, duly nominated at the last Ordinary Meeting, were elected Associates of the Institute:—

Henry Bishop. | D. J. Dowling. | S. J. Turquand.

Mr. Spens read a paper "On the Inadequacy of Existing Data for determining the rate of Mortality among Select Lives"; and the Meeting adjourned to Monday, the 28th of November.

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*Annual General Meeting.—Saturday, 2nd July, 1853.*

JOHN FINLAISON, Esq., President, in the Chair.

The Circular convening the Meeting was read.

The Minutes of the last Ordinary Meeting were read and confirmed.

The following Report of the Council on the progress of the Institute during the past year was read, viz. :—

### "REPORT OF THE COUNCIL.

"The Council are gratified that they are enabled again to make a favourable report of the progress of the Institute during the past Session.

"It appears that the number of new members elected is thirty-seven, and that the number of withdrawals, including deaths, is seventeen. The total number of members on the books of the Institute is at the present time 264.

"The decease of Mr. Porter, one of your honorary members, is an event much to be deplored. His loss as a statistician of the highest order will long be felt.

"The Donations to the Library continue to be of a most liberal character; and in addition to the long list of Societies interchanging Transactions with the Institute, the Council have the satisfaction of recording the Franklin Institute of Philadelphia and the Smithsonian Institution of Washington. In connection with this part of the subject, it may be mentioned that an Association has been organized in Germany, of the managers of the principal Assurance Companies there; and that amongst other arrangements it is proposed by them that the manager of the Association should put himself, in that capacity, in communication with the Institute, for general purposes as well as for the interchange of such information as may be useful in the conduct of the periodical which it is part of their plan to establish.

"During the Session, the nine following Papers have been read, viz. :—

- 'On Formulæ for obtaining the Values of Policies at an Intermediate Period of the Year.' By James Meikle, Esq.
- 'On the Life Assurance Companies of Germany: their Constitution, Condition, and Prospects.' By Herr Rath G. Hopf, of Gotha. Translated from the German by Samuel Brown, Esq.
- 'On the Insurance Companies of Austria.' By Herr S. A. Daninos, of Trieste. Translated from the French.
- 'On the objectionable Character of certain Methods, very generally practised, for Determining and Dividing Surplus in Life Assurance Companies.' By Charles Jellicoe, Esq.
- 'An Exposé of the Fallacy, That it is just to tax Temporary Annuities at the same rate as Perpetual Annuities.' By Peter Hardy, Esq., F.R.S.
- 'On the Reliability of Data, when tested by the conclusions to which they lead.' By E. J. Farren, Esq.
- 'On the Theory of Progressive Mortality, and its Application to Valuations.' By James Meikle, Esq.
- 'Concerning the Renewal of Leaseholds for Lives or Years that have been the subject of Settlement.' By C. J. Bunyon, Esq.
- 'On the Inadequacy of Existing Data for determining the Rate of Mortality among Select Lives.' By William Spens, Esq.

"Seven of the foregoing Papers have been printed, at length or in abstract, in the Journal of the Institute. Notices of them and of discussions upon them will be found also in the *Athenæum* and in other periodicals. The sale of the Journal itself continues to increase.

"As the Council ventured to anticipate in their last Report, the recommendations of the Parliamentary Committee on Friendly Societies proved to be in close accordance with the terms of the petition which the Council had the honour to present. As yet, however, nothing has been done by the Legislature in reference to those recommendations.

"The Council have kept a careful watch over the proceedings in the Parliamentary Committee now sitting on Life Assurance Associations, and it will no doubt be satisfactory to the members to learn that the resolutions come to by them in reference to that inquiry have been placed before the Committee, and will be found embodied in the evidence; and the Council are inclined to believe that measures will be recommended by the Committee much in accordance with those advocated in the resolutions.

"The Succession Duty Bill recently introduced by the Chancellor of the Exchequer containing several provisions of a character likely to affect injuriously Life Assurance and Reversionary Interest Companies, and some curious anomalies appearing in the Schedule annexed to the Bill, the Council have addressed the Chancellor on the subject, and are not without hope that the objects which they had in view in doing so may be attained, one of the objectionable clauses having been already amended.

"The Council have considered it expedient to recommend some slight modifications in the existing laws of the Institute, the effect of which will be best explained when they come to be discussed, and they will not therefore detain the meeting further than to express their satisfaction at the general success which evidently attends their labours; for it cannot, they think, be denied, that a considerable impulse has been given to the cultivation of the Actuary's peculiar knowledge—that indications of improvement both in theory and practice are already perceptible—and that the public mind begins to recognize more distinctly the characteristics of a profession, destined, they trust, at no distant day, to assume the position to which the arduous nature of its investigations, its responsible character, and extensive utility, so fully entitle it."

(Signed) "SAMUEL BROWN, }  
"J. HILL WILLIAMS. } *Honorary Secretaries.*"

24th June, 1853.

Resolved unanimously—

“That the Report be received, printed, and circulated among the members.”

An abstract of the receipts and expenditure for the financial year ended the 30th of April last was read and approved.

Resolved unanimously—

“That the following alterations be made in the Constitution and Laws of the Institute :—

‘In clause 5, to omit the words ‘*have a claim to*’; and for the word ‘*elected*,’ to substitute the word ‘*admitted*.’

‘In clause 6, to omit ‘*not less than three-fourths*,’ and substitute the words ‘*a majority*’; and at the end of the clause, to add the words ‘*Provided always, that no person be elected under this rule, until a certificate of his nomination by the Council shall have been suspended in the manner provided under Rule 4.*’

‘To alter clause 14 thus :—‘*Until a member shall have paid up all his arrears, and given notice of resignation in writing to one of the Secretaries, he shall be considered liable for all subscriptions due.*’

‘To alter clause 19 thus :—‘*The Annual Subscription for Members residing beyond twenty miles of London shall be as follows, viz. :— Fellows, Two Guineas; Official Associates, One Guinea and a Half; Associates, One Guinea.*’

‘In clause 20, to omit ‘*before the first of May*,’ and substitute the words ‘*on or before the 30th of April.*’

‘In clause 28, to omit the word ‘*their*,’ and substitute the words ‘*the remaining*.’

‘In clause 33, to omit the words ‘*Associates and Fellows*,’ and substitute the word ‘*Members*.’”

The Meeting then proceeded to the election of President, Council, and Officers for the year ensuing; and a ballot having taken place, the following was declared to be the List :—

*President.*

John Finlaison, Esq. (late Government Actuary.)

*Vice-Presidents.*

Edwin James Farren, Esq.

Peter Hardy, Esq., F.R.S.

Holmes, Ivory, Esq.

Charles Jellicoe, Esq.

*Treasurer.*

John Laurence, Esq.

William Meredith Browne, Esq.

Charles John Bunyon, Esq., M.A.

\*Percy Matthew Dove, Esq.

Frederick Hendriks, Esq.

William Barwick Hodge, Esq.

Jenkin Jones, Esq.

\*John King, Esq.

\*Charles Terrell Lewis, Esq.

\*William Lewis, Esq.

Donald Lindsay, Esq.

George Henry Pinckard, Esq.

\*John Reddish, Esq.

James Michael Terry, Esq.

Robert Tucker, Esq.

*Honorary Secretaries.*

Samuel Brown, Esq.; J. Hill Williams, Esq.

Resolved unanimously—

“That Mr. Emmens, Mr. Henderson, and Mr. F. G. Smith, be re-elected Auditors for the year ensuing.

“That the thanks of the Meeting be given to the President, Council, and Officers, for their services during the past year.

“That the thanks of the Meeting be given to the Auditors.”

A special vote of thanks was then passed to the President for his conduct in the chair this day, and the Meeting separated.

## ORIGINAL TABLES.

*To the Editor of the Assurance Magazine.*

SIR,—Probably it may not be without advantage to draw the attention of the members of the Institute of Actuaries to a valuable paper by Mr. Neison, in part iii. vol. xiii. of the *Journal of the Statistical Society*, on the “Mortality of Master Mariners.” The paper contains the experience of the Master Mariners’ Society for the fourteen years from 1835-48: the precise nature of the data, however, will be best understood by a reference to the paper itself. From the originals of Table I I have constructed the accompanying Table of Single and Annual Premiums for assurance at 3 per cent. These premiums, with a reasonable margin, may I think be considered quite applicable for general cases. I may mention that they have been carefully computed in duplicate, so that their accuracy may be relied upon.

EDWIN H. GALSWORTHY.

*Medical Invalid Life Office,  
25, Pall Mall.*

26th August, 1853.

*Premiums for an Assurance of £1 payable at Death.  
Mortality of Master Mariners. 3 per Cent.*

AGE.	Single Premium.	Annual Premium.	AGE.	Single Premium.	Annual Premium.
21	·46823	·02559	46	·60502	·04454
22	·47381	·02617	47	·61118	·04571
23	·47914	·02674	48	·61745	·04694
24	·48426	·02729	49	·62406	·04828
25	·48914	·02783	50	·63175	·04989
26	·49381	·02836	51	·64028	·05177
27	·49828	·02887	52	·64934	·05385
28	·50260	·02937	53	·65877	·05615
29	·50676	·02987	54	·66841	·05863
30	·51046	·03031	55	·67781	·06119
31	·51421	·03077	56	·68705	·06385
32	·51799	·03124	57	·69621	·06666
33	·52190	·03174	58	·70533	·06962
34	·52609	·03227	59	·71438	·07275
35	·53067	·03287	60	·72324	·07601
36	·53568	·03354	61	·73205	·07947
37	·54114	·03429	62	·74077	·08312
38	·54705	·03511	63	·74952	·08704
39	·55335	·03602	64	·75850	·09137
40	·56051	·03709	65	·76734	·09594
41	·56816	·03826	66	·77604	·10080
42	·57604	·03951	67	·78472	·10604
43	·58398	·04082	68	·79332	·11167
44	·59181	·04216	69	·80182	·11770
45	·59868	·04338	70	·81024	·12422



TABLE I.

*Instant of Death.—Carlisle 3 per Cent.*

Age of <i>x</i>	<i>C<sub>x</sub></i>	<i>M<sub>x</sub></i>	Age of <i>x</i>	<i>C<sub>x</sub></i>	<i>M<sub>x</sub></i>
0	1516256	47330575	53	1398524	52361819
1	6523508	32168015	54	1397725	50963295
2	4689764	25644507	55	1415173	49565570
3	2488465	20954743	56	1430418	48150397
4	1759467	18466278	57	1498394	46719979
5	1028332	16706811	58	1649901	45221585
6	6765885	156784794	59	1825760	43571684
7	4646238	150018909	60	2040141	41745924
8	3344296	145372671	61	2045662	39705783
9	2491798	142028375	62	2001842	37660121
10	2125983	139536577	63	1912929	35658279
11	2206410	137410594	64	1857213	33745350
12	2211247	135204184	65	1788694	31888137
13	2213931	132992937	66	1722592	30099443
14	2279717	130779006	67	1672419	28376851
15	2466267	128499289	68	1623707	26704432
16	2578622	126033022	69	1589231	25080725
17	2563124	123454400	70	1542944	23491494
18	2488471	120891276	71	1618810	21948550
19	2415991	118402805	72	1712406	20329740
20	2345622	115986814	73	1776402	18617334
21	2224342	113641192	74	1835217	16840932
22	2159556	111416850	75	1717363	15005715
23	2096655	109257294	76	1625659	13288352
24	2035588	107160639	77	1477136	11662693
25	2023354	105125051	78	1296595	10185557
26	1964422	103101697	79	1220684	8889662
27	195912	101137275	80	1074024	76682780
28	2153087	99141363	81	10067851	65942538
29	2341222	96988276	82	8901882	55874687
30	2313621	94647054	83	7964750	46972805
31	2246234	92333433	84	6910133	39008055
32	2142549	90087199	85	6229663	32097922
33	2042999	87944650	86	5505426	25868259
34	1983495	85901651	87	4818097	20362833
35	1925723	83918156	88	3727593	15544736
36	1903632	81992433	89	2767487	11817143
37	1881185	80088801	90	2549092	9049656
38	1858436	78207616	91	2006633	6500564
39	1897632	76349180	92	1363731	4493931
40	1993374	74451548	93	08826734	31302002
41	2023284	72458174	94	6121176	22475268
42	2021291	70434890	95	4160023	16354092
43	1962419	68413599	96	2884897	12194069
44	1905260	66451180	97	2440697	9309172
45	1823715	64545920	98	1631576	7068475
46	1745303	62722205	99	1056036	5436899
47	1645353	60976902	100	1025278	4380863
48	1502062	59331549	101	0995415	3355585
49	1412016	57829487	102	0966423	2360170
50	1325943	56417471	103	0938274	1393747
51	1352780	55091528	104	0455473	0455473
52	1376929	53738748			

TABLE II.  
Instant of Death.—Carlisle 3 per Cent.

Age of $x$	Value of Reversion $= \frac{1 - iA}{1 + \frac{i}{2}}$	Annual Premium.	Age of $x$	Value of Reversion $= \frac{1 - iA}{1 + \frac{i}{2}}$	Annual Premium.
0	.4733058	.0258357	53	.5956654	.0420075
1	.3915974	.0185729	54	.6069497	.0439876
2	.3497397	.0155437	55	.6184621	.0461239
3	.3147900	.0132918	56	.6301217	.0484180
4	.2969985	.0122298	57	.6419414	.0508899
5	.2849459	.0115397	58	.6536532	.0534989
6	.2804213	.0112865	59	.6647910	.0561420
7	.2798064	.0112523	60	.6751316	.0587511
8	.2817531	.0113607	61	.6843188	.0612062
9	.2854071	.0115657	62	.6923456	.0637552
10	.2902871	.0118427	63	.7024632	.0664792
11	.2957679	.0121583	64	.7119540	.0694891
12	.3012013	.0124759	65	.7216550	.0727670
13	.3066969	.0128021	66	.7316727	.0763877
14	.3122572	.0131374	67	.7420305	.0804111
15	.3177741	.0134753	68	.7526562	.0848689
16	.3230251	.0138019	69	.7635667	.0898388
17	.3281095	.0141230	70	.7746832	.0953667
18	.3332405	.0144518	71	.7861147	.1016118
19	.3385292	.0147960	72	.7968744	.1080888
20	.3439820	.0151565	73	.8065972	.1146176
21	.3496047	.0155345	74	.8152050	.1207317
22	.3555140	.0159387	75	.8223062	.1262766
23	.3616112	.0163634	76	.8292538	.1321123
24	.3679033	.0168100	77	.8356908	.1379234
25	.3743981	.0172803	78	.8422242	.1442636
26	.3809941	.0177677	79	.8495052	.1519215
27	.3878045	.0182818	80	.8562152	.1596010
28	.3946212	.0188076	81	.8634862	.1686919
29	.4011219	.0193199	82	.8700206	.1776407
30	.4071840	.0198076	83	.8766942	.1876546
31	.4133231	.0203115	84	.8831318	.1982765
32	.4196491	.0208415	85	.8897766	.2103877
33	.4262768	.0214091	86	.8955760	.2220614
34	.4332199	.0220176	87	.9002950	.2324338
35	.4403845	.0226609	88	.9031736	.2391899
36	.4477801	.0233420	89	.9060462	.2473349
37	.4553098	.0240540	90	.9113684	.2604871
38	.4629794	.0247991	91	.9119042	.2619976
39	.4707943	.0255800	92	.9090542	.2541388
40	.4785494	.0263774	93	.9058164	.2457091
41	.4860293	.0271687	94	.9043656	.2420915
42	.4934286	.0279737	95	.9037356	.2405512
43	.5008449	.0288039	96	.9053042	.2444201
44	.5084876	.0296849	97	.9095976	.2556047
45	.5163667	.0306214	98	.9146306	.2699349
46	.5245989	.0316321	99	.9222394	.2945613
47	.5332019	.0327251	100	.9354910	.3487312
48	.5422981	.0339242	101	.9489206	.4258719
49	.5521198	.0352718	102	.9624322	.5434274
50	.5624945	.0367589	103	.9756562	.7371125
51	.5734478	.0384047	104	.9852219	.9852219
52	.5845015	.0401507			

TABLE III.

*Instant of Death, according to Mr. Sang.—Carlisle 3 per Cent.*

Age of $x$	$C_x$	$M_x$	Age of $x$	$C_x$	$M_x$
0	1516421	473357	53	139868	5236757
1	652422	3217152	54	139788	5096889
2	469027	2564730	55	141533	4957101
3	248874	2095703	56	143057	4815568
4	175966	1846829	57	149856	4672511
5	102844	1670863	58	165008	4522655
6	676662	15680190	59	182596	4357647
7	464674	15003528	60	204036	4175051
8	334466	14538854	61	204588	3971015
9	249207	14204388	62	200206	3766426
10	212621	13955181	63	191314	3566220
11	220665	13742560	64	185742	3374906
12	221149	13521895	65	178889	3189164
13	221417	13300746	66	172278	3010275
14	227997	13079329	67	167260	2837997
15	246654	12851333	68	162389	2670737
16	257890	12604679	69	158941	2508349
17	256340	12346789	70	154311	2349408
18	248874	12090449	71	161899	2195097
19	241625	11841575	72	171259	2033198
20	234588	11599950	73	177660	1861939
21	222458	11365362	74	183542	1684279
22	215979	11142903	75	171755	1500737
23	209688	10926924	76	162584	1328982
24	203581	10717236	77	147730	1166398
25	202357	10513655	78	129674	1018668
26	196464	10311298	79	122082	888994
27	199613	10114834	80	107414	766912
28	215332	9915221	81	100690	659498
29	234148	9699889	82	890285	5586078
30	231387	9465741	83	796562	4697793
31	224648	9234354	84	691089	3901231
32	214278	9009706	85	623034	3210142
33	204322	8795428	86	550603	3587108
34	198371	7591106	87	481862	2036505
35	192593	8392735	88	372800	1554643
36	190384	8200142	89	276779	1181843
37	188139	8009758	90	254937	905064
38	185864	7821619	91	200685	650127
39	189784	7635755	92	136388	449442
40	199359	7445971	93	882778	3130542
41	202351	7246612	94	612185	2247772
42	202151	7044261	95	416048	1635587
43	196264	6842110	96	288521	1219539
44	190547	6645847	97	224094	931018
45	182391	6455300	98	163175	706924
46	174549	6272909	99	105615	543749
47	164553	6098360	100	102539	438134
48	150223	5933807	101	0995524	3355952
49	141217	5783584	102	0966528	2360428
50	132609	5642367	103	0938377	1393900
51	135293	5509758	104	0455523	0455223
52	137708	5374465			

TABLE IV.

*Instant of Death, according to Mr. Sang.—Carlisle 3 per Cent.*

Age of $x$	Value of Reversion $= \frac{1-iA}{\sqrt{1+i}}$	Annual Premium.	Age of $x$	Value of Reversion $= \frac{1-iA}{\sqrt{1+i}}$	Annual Premium.
0	.4733570	.0258385	53	.5957310	.0420121
1	.3916402	.0185750	54	.6070163	.0439924
2	.3497778	.0155454	55	.6185300	.0461290
3	.3148242	.0132933	56	.6301909	.0484233
4	.2970309	.0122311	57	.6420119	.0508955
5	.2849769	.0115410	58	.6537249	.0535048
6	.2804518	.0112877	59	.6648643	.0561482
7	.2798370	.0112535	60	.6752056	.0587576
8	.2817836	.0113619	61	.6843938	.0612129
9	.2854383	.0115669	62	.6934218	.0637622
10	.2903187	.0118440	63	.7025403	.0664865
11	.2958003	.0121596	64	.7120323	.0694967
12	.3012343	.0124772	65	.7217340	.0727750
13	.3067303	.0128035	66	.7317530	.0763961
14	.3122914	.0131388	67	.7421120	.0804199
15	.3178089	.0134768	68	.7527390	.0848783
16	.3230604	.0138045	69	.7636512	.0898487
17	.3281452	.0141245	70	.7747685	.0953772
18	.3332769	.0144534	71	.7862012	.1016230
19	.3385665	.0147976	72	.7969622	.1081007
20	.3440197	.0151582	73	.8066866	.1145303
21	.3496432	.0155362	74	.8152950	.1207450
22	.3555530	.0159404	75	.8223974	.1262906
23	.3616506	.0163651	76	.8293456	.1321270
24	.3679435	.0168119	77	.8357830	.1379386
25	.3744388	.0172822	78	.8423166	.1442795
26	.3810358	.0177697	79	.8495990	.1519383
27	.3878470	.0182838	80	.8563092	.1596184
28	.3946644	.0188097	81	.8635808	.1687103
29	.4011657	.0193221	82	.8701154	.1776601
30	.4072284	.0198098	83	.8767898	.1876750
31	.4133685	.0203137	84	.8832278	.1982980
32	.4196950	.0208438	85	.8898736	.2104106
33	.4263235	.0214115	86	.8956734	.2220856
34	.4332672	.0220200	87	.9003932	.2324592
35	.4404328	.0226634	88	.9032718	.2392159
36	.4478291	.0233446	89	.9065550	.2473618
37	.4553598	.0240566	90	.9114674	.2605154
38	.4630802	.0248018	91	.9120032	.2620260
39	.4708460	.0255828	92	.9091532	.2541664
40	.4786019	.0263803	93	.9059154	.2457359
41	.4860827	.0271716	94	.9044642	.2421180
42	.4934827	.0279768	95	.9038338	.2405773
43	.5008999	.0288071	96	.9054020	.2444465
44	.5085435	.0296882	97	.9096962	.2556324
45	.5164234	.0306248	98	.9147298	.2699642
46	.5246565	.0316355	99	.9223400	.2945935
47	.5332604	.0327287	100	.9355930	.3487693
48	.5423576	.0339279	101	.9490246	.4259185
49	.5521802	.0352757	102	.9625374	.5434867
50	.5625562	.0367629	103	.9757630	.7371933
51	.5735107	.0384090	104	.9853293	.9853293
52	.5845657	.0401551			

THE  
ASSURANCE MAGAZINE,  
AND JOURNAL OF  
THE INSTITUTE OF ACTUARIES.

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*Report of the Proceedings at the Statistical Congress, held at Brussels, 19th to 22nd September, 1853. By SAMUEL BROWN, F.S.S., one of the Honorary Secretaries of the Institute of Actuaries.*

THE study of statistics is so peculiarly connected with the vocation and intellectual pursuits of the actuary, that I feel convinced there is no member of the Institute who will not be interested in a full report of the very important meeting recently held at Brussels. I apprehend that the real business of the actuary is the reasoning on all events to which the mathematics of probability can be applied, and reducing the conclusions to a form in which they can be practically used for the public benefit. His study is the doctrine of averages; and though his functions have been hitherto confined in a great measure to subjects relating to the assurance of human life, there are evidently many other topics to which, in time, his attention ought to be directed. The discovery of the mathematical laws of events will eventually be recognized as the sole means of bringing uncertainty to certainty, and out of irregularity deducing order. Whilst men depend only on their individual experience and skill, without consulting the laws deduced by mathematics from a large collection of facts, they will often be astonished, as they frequently are now, in fire and marine assurance, by fluctuations which upset all their rules of practice, but which the mathematician, if he had been furnished with the previous results of their experience, would have predicted with almost unerring

certainty.\* The object of statistics is the collection of facts from which the mathematician may deduce the laws of social, moral, and physical phenomena.

The value of statistical inquiries has not been publicly recognized in Great Britain for any great length of time. The establishment of the Statistical Society, in 1834, was the first successful attempt to bring together those who were engaged in a common pursuit, and to render the results of their isolated labours not only capable of being compared together, but more useful for the practical purposes of government and for the public good. The formation of the Society tended not only to remedy the defects and errors of past modes of observation, but to give an impetus to studies which the growing desire to collect facts before deducing theories has rendered doubly interesting in this practical age. The Conference which has recently taken place at Brussels had the same object in view, but on a more enlarged scale; and it is difficult to overrate its importance. Whatever progress statistics may have made in a kingdom, will be greatly accelerated by a comparison with what has been effected in other countries. Governments may, besides, be induced to take more enlarged views in collecting such returns as serve to show by actual facts the social, commercial, industrial, or educational condition of a people. On many subjects, too, especially in the statistics of population and commerce, it is important to be able to compare the changes that may be going on, and the effects they produce on the industry and trade of different nations; and it is evident that much labour is thrown away unless a general system of uniformity could be arranged, under which facts might be collected and published relating to the same periods, and classified under some general heads.

It is greatly to the credit of Belgium, and exhibits in a most favourable point of view the liberal and enlightened principles of her Government, that the idea of bringing together from all parts of Europe official authorities or distinguished writers on statistics and political economy should be there so practically and energetically carried out. That success has been so completely achieved, is owing to the zeal and energy and the wide-world reputation of M. Quetelet, the distinguished President of the Commission Centrale de Statistique de Belgique, and Directeur de l'Observatoire

\* It has become the custom of late, for those who set themselves against mathematical conclusions in the doctrines of probability, to call themselves "the men of business"; as if theory and practice were necessarily opposed to each other. On the same principle, the physician who has studied most deeply the organization of the human frame and the disorders to which it is subject, is the last person whom we ought to consult in practice.

Royal de Bruxelles. Without his indefatigable exertions, and the certainty of which his name and writings were a warrant, that the reunion proposed would not end in idle results, but be the commencement of a new era in statistical science, it might have been difficult to have united both Governments and individuals in a common purpose.

It is gratifying to reflect that this Congress, like the one which the Institute of Actuaries had the honour of calling in connection with assurance subjects, is another of the results of the Great Exhibition, which has been the means of stimulating so many nations to a peaceful and honourable rivalry in science, industry, and art. I am informed by M. Quetelet that it was in 1851, in conversation with two distinguished and now lamented members of the Statistical Society (Messrs. G. R. Porter and Joseph Fletcher), that the original proposition was first mooted, though it could not immediately be carried out. In May, 1852, the Commission Centrale de Statistique de Belgique issued a circular to their correspondents to consult them as to the advantage of the proposed reunion, and the nature of the subjects that could be most usefully discussed. The idea was well received, but various circumstances hindered the earlier realization of the project; and it was not till May, 1853, that, having obtained the authorization of the Belgian Government to the meeting, the invitations were sent out, accompanied by a programme of the questions to be considered. The comprehensive nature of this programme will be understood by the following brief summary of the contents:—The first section embraces the organization of statistics, census of the population, the territorial surveys, and valuation of land; the second section comprises the statistics of agriculture, industry, and commerce; and the third section includes the economical condition of the working classes, pauperism, means of instruction and state of education, crime and its suppression. In order to economize the time and labour of the assembly, the rules and regulations to be submitted as a preliminary step for the government of the assembly were also proposed; and the best proof of the simplicity and foresight with which they had been prepared was the admirable order with which a body composed of men from all parts of Europe—some officially interested in certain systems, others by their positions or published works opposed thereto, and several having their peculiar views on many debateable points—were yet enabled to discuss with calmness, temper, and dignity, and resolve upon, a general programme, embracing subjects the most complex and varied that can be imagined,

and involving questions both social and political, of the most intense interest.

The Congress was opened on Monday, the 19th September, and assembled in the rooms of the Académies Royales des Sciences et de Médecine. About 100 members were present. At about half-past eleven o'clock, M. Quetelet, Président de la Commission Centrale de Statistique, took the chair. The other members of the Committee of Organization—M. Piercot, Minister of the Interior; MM. Partoes, Visschers, Le Général Trumper, M. Rivort, and MM. Heuschling and Ducpetiaux, the Secretaries—took their seats with him.

M. QUETELET, having in a few words introduced the subject of the Congress, called upon M. HEUSCHLING, the Secretary of the Commission Centrale de Statistique, to read the names of the gentlemen who had given in their support to the Congress.

A complete list of the names follows, in order to preserve a record of the distinguished men who at this time are devoting their attention to the study of statistics. The members marked thus \* were present, and took part in the proceedings.

#### AUTRICHE.

\*M. LE BARON DE CZOERNIG, chef de section au ministère du commerce et des travaux publics, directeur de la statistique administrative, à Vienne.

#### BAVIÈRE.

\*M. F.-G. DE HERMANN, conseiller au ministère des finances, à Munich.

M. DENZINGER, professeur de statistique à l'université de Wurzburg.

#### BELGIQUE.

\*M. ARNOULD, administrateur-inspecteur de l'université de Liège.

\*M. LE COMTE ARRIVABENE, à Bruxelles.

M. BENOIT, régisseur de la terre de Marche-les-Dames, à Namur.

\*M. BOVY, membre de la députation permanente, à Hasselt.

M. BOSCH, colonel du génie, à Arlon.

\*M. PHILIPPE BOURSON, directeur du *Moniteur*, à Bruxelles.

M. JEAN-BAPTISTE BIVORT, chef de division au ministère de l'intérieur, à Bruxelles.

M. BELLEFROID, chef de division au ministère de l'intérieur, à Bruxelles.

\*M. FLORIAN BALLIEU, chef de bureau au ministère des travaux publics, à Bruxelles.

\*M. CAMBRELIN, président de la commission médicale, à Namur.

\*M. CROUSSE, directeur des contributions directes, à Namur.

M. F. CORBISIER, membre de la chambre de commerce de Mons.

\*M. E. COGELS, ancien sénateur, à Anvers.

M. ULYSSE CAPITAIN, à Liège.

M. L'ABBE CARTON, directeur de l'institute des sourds, muets, et des aveugles, à Bruges.

\*M. RENIER CHÂLON, correspondant de l'académie royale, à Bruxelles.

\*M. AUG. CLAVAREAU, docteur en droit, chef de bureau au ministère des finances, à Bruxelles.

\*M. SEBASTIEN COSTANTINI, secrétaire de la caisse des propriétaires, à Bruxelles.

\*M. ARMAND DE PERCEVAL, membre de la chambre des représentants, à Malines.

M. DEROTE, administrateur-inspecteur de l'université de Gand.

\*M. DE CORSWAREM, ancien représentant, à Hasselt.



- \*M. LE BARON DE SELYS-LONGCHAMPS, à Waremme (Liège).
- M. A. DUFOUR, greffier provincial, à Mons.
- \*M. A.-J. DELNEUF-COUR, ingénieur des mines, membre de la chambre de commerce de Mons.
- M. CHARLES DE BROUCKERE, bourgmestre de la ville de Bruxelles, membre de la chambre des représentants, à Bruxelles.
- \*M. JOS. DIEUDONNE, membre de l'académie de médecine, à Bruxelles.
- \*M. LE DOCTEUR JULES D'UDEKEM, à Bruxelles.
- \*M. EDOUARD DUCPETIAUX, inspecteur des prisons, à Bruxelles.
- \*M. FRANÇ.-CH. DE LANNOY, conseiller à la cour d'appel de Bruxelles.
- \*M. CH. DE HOFFMANN, secrétaire général de la compagnie d'assurance générale sur la vie et contre l'incendie, à Bruxelles.
- M. FALLOT, vice-président de l'académie royale de médecine de Belgique, à Bruxelles.
- \*M. THOMAS FORSTER, astronome, à Bruxelles.
- \*M. GUOITH, ingénieur des ponts et chaussées, à Anvers.
- \*M. J. DAUBY, inspecteur général honoraire de l'enregistrement, à Bruxelles.
- \*M. GACHARD, archiviste général du royaume, à Bruxelles.
- \*M. JEAN-BAPTISTE GROETEAERS, capitaine du génie en non-activité, à Saint-Josse-ten-Noode.
- \*M. HENNAU, professeur d'économie politique à l'université de Liège.
- M. LEOPOLD HALBRECK, secrétaire de la commission d'agriculture, à Mons.
- \*M. J.-E. HORN, à Bruxelles.
- \*M. FREDERIC HAIRION, professeur à l'université de Louvain.
- \*M. XAVIER HEUSCHLING, chef de division au ministère de l'intérieur, secrétaire de la commission centrale de statistique, à Bruxelles.
- \*M. LE DOCTEUR HANNON, à Nivelles.
- \*M. HUART, avoué, à Bruxelles.
- M. ISTA, commissaire du gouvernement près la société générale, à Bruxelles.
- M. JACQUELART, directeur des contributions, à Arlon.
- \*M. EDOUARD JUSTE, professeur de rhétorique latine, à Arlon.
- \*M. AUGUSTE KREGLINGER, commissaire du gouvernement près la banque nationale, à Bruxelles.
- M. HENRI KERVYN, inspecteur provincial de l'enseignement primaire, à Gand.
- \*M. LAMBRECHTS, président de la commission médicale d'Anvers.
- \*M. LEJEUNE, inspecteur du cadastre, à Hasselt.
- M. A.-F. LACROIX, archiviste provincial, à Mons.
- \*M. LENTZ, chef de division au ministère de la justice, à Bruxelles.
- \*M. ALPHONSE LECLERCQ, docteur en médecine, à Bruxelles.
- \*M. LE DOCTEUR LEBON, à Nivelles.
- \*M. MINET, receveur des droits de navigation, à Namur.
- M. MAGIS, ingénieur-en-chef, directeur des ponts et chaussées, à Hasselt.
- \*M. LE DOCTEUR MARESKA, à Gand.
- \*M. VICTOR MISSON, commissaire d'arrondissement, à Mons.
- \*M. HIPPOLYTE MATHIEU, secrétaire de la caisse de retraite, à Bruxelles.
- \*M. MELSENS, professeur à l'école vétérinaire de l'état, à Bruxelles.
- \*M. LE DOCTEUR MARINUS, secrétaire-adjoint de l'académie royale de médecine, à Bruxelles.
- \*M. ALPHONSE MOREAU, agronome, à Bruxelles.
- \*M. MOLINARI, professeur d'économie politique, à Bruxelles.
- \*M. PARTORS, secrétaire général au ministère des travaux publics, à Bruxelles.
- \*M. EDOUARD PERROT, rédacteur-en-chef de *l'Indépendance belge*, à Bruxelles.
- \*M. PUTZEYS, directeur au ministère de la justice, à Bruxelles.
- \*M. JEAN-BAPTISTE PINCHARD, receveur des contributions, à Bruxelles.
- \*M. ADOLPHE QUETELET, directeur de l'observatoire royal, président de la commission centrale de statistique, à Bruxelles.
- M. QUOILIN, secrétaire général du ministère des finances, à Bruxelles.
- M. RAINGO, directeur de l'école d'agriculture de la Trapperie.
- \*M. E. RAINBEAUX, industriel, à Mons.
- \*M. JOSEPH REDEMANS, médecin de la maison du Roi, membre du conseil de salubrité publique d'Ixelles.
- \*M. DIEUDONNE SAUVEUR, inspecteur du service de santé civil, à Bruxelles.
- \*M. AUGUSTE SCHELER, bibliothécaire-adjoint du Roi, à Bruxelles.
- M. SOVET, médecin de la maison du Roi, à Beauraing.
- \*M. T'KINT DE NAEYER, membre de la chambre des représentants.
- \*M. THEIS, secrétaire du conseil supérieur d'hygiène, à Bruxelles.

- \*M. LE GENERAL MAJOR TRUMPER, à Hasselt.
- \*M. FRANÇOIS THOMAS, directeur général du chemin de fer de Turahout, à Bruxelles.
- \*M. VANDERMEERSCH, archiviste provincial, à Gand.
- M. PHIL. VANDERMAELEN, fondateur de l'établissement géographique, à Bruxelles.
- \*M. VANLERBERGHE, à Kain (près de Tournai).
- \*M. VLEMINCKX, inspecteur général du service de santé de l'armée, président de l'académie royale de médecine, à Bruxelles.
- \*M. VAN DEN BULCKE, commissaire d'arrondissement de Bruges et d'Ostende.
- \*M. AUGUSTE VISSCHERS, conseiller des mines, à Bruxelles.
- \*M. CESAR-ALEX. VANDERZANDEN, sous-inspecteur au ministère des travaux publics, à Bruxelles.
- \*M. ABEL WAROCQUIE, industriel, à Marimont.
- \*M. VICTOR WALTER, conseiller communal, à Bruxelles.
- M. VAN MEENEN, président de chambre à la cour de cassation de Belgique, à Bruxelles.
- \*M. T. LARCHEVEQUE, professeur, à Bruxelles.
- \*M. JANSSENS, inspecteur au ministère des travaux publics, à Bruxelles.
- \*M. COQUIL, économiste, à Anvers.
- \*M. DURANT, homme de lettres, à Bruxelles.
- \*M. STAS, professeur à l'école militaire, à Bruxelles.
- \*M. LE BARON DE CRASSIER, secrétaire général du ministère de la justice, à Bruxelles.
- \*LE DOCTEUR VERSTRAETEN, vérificateur des décès, à Bruxelles.

## DANEMARK.

- \*M. BERGSOE, professeur d'économie politique et chef du département de la statistique, à Copenhague.
- \*M. CHRETIEN DAVID, conseiller d'état, à Copenhague.

## DEUX-SICILES.

- M. LE CHEVALIER BENOIT CANTALUPO, conseiller à la cour de justice, à Naples.

## EGYPTE.

- \*MAHMOUD EFFENDI et ISMAEL EFFENDI, astronomes au Caire.

## ESPAGNE.

- \*M. RAMON DE LA SAGRA, commissaire espagnol, à Madrid.

## ETATS-UNIS.

- M. DE BAW, chef du bureau de statistique fédérale, à New York.

## FRANCE.

- \*M. ALFRED LEGOYT, chef du bureau de statistique générale de France, au ministère de l'agriculture, du commerce, et des travaux publics, à Paris.
- M. MOREAU DE JONNES, membre de l'institut de France, à Paris.
- \*M. MAURICE BLOCK, sous-chef au ministère de l'agriculture, du commerce, et des travaux publics, à Paris.
- M. BENOISTON DE CHATEAUNEUF, membre de l'institut de France, à Paris.
- M. AYMAR BRESSON, secrétaire général de la société française de statistique universelle, à Paris.
- M. LE DOCTEUR BOUDIN, médecin-en-chef de l'hôpital militaire du Roule, à Paris.
- M. MAGENDIE, membre de l'institut, à Paris.
- \*M. LE DOCTEUR ROUX, secrétaire perpétuel de la société de statistique de Marseille.
- \*M. HORACE SAY, ancien conseiller d'état, l'un des vice-présidents de la société d'économie politique de Paris.
- M. LOUIS-RENNE VILLERME, membre de l'institut, à Paris.
- \*M. VALENTIN SMITH, conseiller à la cour d'appel de Lyon.
- M. WOLOWSKI, directeur du crédit foncier de France, à Paris.
- M. SIGEFROID WEISS, à Paris.
- M. DUPLAN, avocat à la cour impériale, rédacteur du *Journal de l'Empire*, à Paris.
- M. DE LA NOURAIS, à Versailles.

- M. GUILLAUMIN, éditeur du *Journal des Economistes*, à Paris.
- \*M. JOSEPH GARNIER, rédacteur-en-chef du *Journal des Economistes*.
- \*M. ACHILLE GUILLARD, docteur des sciences, à Paris.
- \*M. BLONDEAU, membre de l'institut, à Paris.
- \*M. DE LAVEGNE, ancien sous-directeur au département des affaires étrangères, à Paris.

#### FRANCFORT-SUR-MAINE.

- \*M. LE BARON DE REDEN, conseiller du ministère en retraite, à Francfort-sur-Maine.
- \*M. ALBERT VARRENTTRAPP, secrétaire de la compagnie des assurances, à Francfort-sur-Maine.
- \*M. GEORGE VARRENTTRAPP, à Francfort-sur-Maine.
- \*M. LE DOCTEUR ALBERT ULMANN, à Francfort-sur-Maine.

#### GRAND DUCHE DE BADE.

- \*M. CHARLES MITTERMAIER, conseiller intime, professeur à l'université de Heidelberg.
- M. ROBERT DE MOHL, professeur à l'université de Heidelberg.
- M. RAU, professeur d'économie politique à l'université de Heidelberg.

#### GREAT BRITAIN.

- DR. LEE, Doctors' Commons, London.
- \*MR. LEONE LEVI, Professor of Commercial Law at King's College, London.
- PROFESSOR MORE, Edinburgh.
- \*MESSRS. SAMUEL BROWN, F.S.S., and J. HILL WILLIAMS, F.S.S., Honorary Secretaries of the Institute of Actuaries of Great Britain and Ireland, London.
- MR. BABBAGE, London.
- MR. BANNFIELD, London.
- MR. EDWIN CHADWICK, member of the General Board of Health, London.
- MR. DOWNES, London.
- \*VISCOUNT EBRINGTON, London.
- MR. F. G. P. NEISON, Honorary Secretary of the Statistical Society of London.
- \*MR. JAMES ROBERTS, London.
- COLONEL SYKES, F.R.S., member of the Council of the Statistical Society of London.
- MR. ZIMMERMANN, London.
- REV. DR. WHEWELL, F.R.S., President of Trinity College, Cambridge.
- \*DR. WILLIAM FARR, of the General Registry Office for Births, Deaths, and Marriages, London.
- MR. FREDERIC GOSNELL, London.
- THE EARL OF HARROWBY, Fellow of the Statistical Society of London.
- DR. SOUTHWOOD SMITH, member of the General Board of Health, London.
- \*DR. JOHNSON, member of the Royal College of Physicians, London and Edinburgh.
- \*COLONEL DAWSON, London.
- \*M. DE YSASI, London.
- \*MR. HENRY HEATH, of the International Postage Association, London.

#### HAMBOURG.

- \*M. CHARLES-GUILLAUME ASHER, docteur en droit, à Hambourg.
- M. LE DOCTEUR JULIUS, à Hambourg.
- \*M. JOHN HARGREAVE, secrétaire général du directeur du libre échange, à Hambourg.

#### HANOVRE.

- \*M. ABEKEN, chef du bureau de statistique, à Hanover.
- M. HANSEN, professeur à l'université de Göttingue.
- M. WAPPARUS, professeur à l'université de Göttingue.

#### HESSE-CASSEL.

- \*M. PFAFF, docteur en sciences et lettres, à Hesse-Cassel.

#### HESSE GRAND-DUCALE.

- \*M. FREDERIC DAEL, conseiller au tribunal de première instance, à Mayence.

## LUBECK.

M. WEHRMANN, président du comité de statistique de Lubeck.

## NORWEGE.

M. LE DOCTEUR FREDERIC HOLST, professeur à l'université de Christiania.

## PAYS-BAS.

M. LOBATTO, à la Haye.

\*M. ACKERSDYCK, professeur à l'université d'Utrecht.

\*M. DE BAUMHAUER, chef du bureau de statistique au ministère de l'intérieur, à la Haye.

\*M. GERARD FOKKER, juge de paix, à Middelbourg.

\*M. SIMON VISSERING, professeur d'économie politique à l'université de Leyde.

M. WYNNE, négociant à Groningue.

## PORTUGAL.

\*M. D'AVILA, ministre d'état honoraire et député des Cortès.

## PRUSSE.

\*M. GUILLAUME LIPKE, économiste, à Berlin.

\*M. LE COMTE AUGUSTE CIESZKOWSKI, représentant du grand-duché de Posen, à Berlin.

M. LE DOCTEUR CASPER, à Berlin.

\*M. GUILLAUME DIETERICI, conseiller intime, directeur du bureau de statistique, à Berlin.

M. HELMERS, conseiller supérieur des finances, à Cologne.

M. LEOPOLD RANCKE, membre de l'académie de Berlin.

M. ALEXANDRE SCHNEER, docteur en philosophie, à Ohlau, près Breslau.

\*M. SCHUBERT, professeur à l'université de Königsberg.

\*M. EDOUARD STOLLE, docteur en philosophie, à Berlin.

\*M. OTHON HUBNER, directeur des archives centrales de statistique.

## SARDAIGNE.

M. LE COMTE AVOGADRO DI QUAREGNA, à Turin.

M. BONINO, à Turin.

\*M. BERNARDIN BERTINI, député au parlement sarde, à Turin.

M. MANCINI, professeur de droit international, à Turin.

M. PINCHIO, président de la commission de statistique judiciaire des Etats Sardes, à Turin.

M. LE COMTE DE SALMOUR, député et membre de la commission supérieure des Etats Sardes, à Turin.

M. LE COMTE DE SANTA-ROSA, membre du parlement, à Turin.

M. LE DOCTEUR BENOIT TROMPEO, professeur de médecine à l'université de Turin.

M. GIULIO, membre de l'académie royale de Turin.

## SAXE-ROYALE.

\*M. ERNEST ENGEL, chef du bureau de statistique générale, à Dresde.

M. ALBERT WEINLIG, conseiller intime au ministère de l'intérieur, à Dresde.

M. LE DOCTEUR SCHMALZ, à Dresde.

## SUISSE.

\*M. MARC D'ESPINE, docteur en médecine, à Genève.

\*M. DE MEYER DE KNONAU, directeur du bureau des archives, à Zurich.

M. FRANSCINI, chef du département fédéral de l'intérieur, à Berne.

M. V. SCHOENHEER, de Zurich.

## TOSCANE.

M. LE MARQUIS LOUIS RIDOLFI, secrétaire de l'académie économique-agraire de géorgophiles de Florence.

## WURTEMBERG.

\*M. FALLATI, professeur à l'université de Tubingue.

\*M. PAUL SICK, secrétaire du bureau de statistique, à Stuttgart.

\*M. GUILLAUME-LOUIS VOLZ, professeur à l'université de Tubingue.

The **PRESIDENT** then said : Gentlemen, the Committee for the organization of this Congress congratulate themselves on witnessing the complete success of their efforts, and thank you for the confidence which you have shown them in responding to their appeal. Their duties are now terminated ; and it remains, gentlemen, for you now to nominate your permanent Council.

**M. VILLERME** (France) : We beg the President and members of the Provisional Committee to remain on the Council (applause).

The **PRESIDENT** : Gentlemen, my colleagues and myself thank you for this new proof of your confidence. We will endeavour to justify it by our exertions. We must not, however, leave you in ignorance that, if we have succeeded, we owe our success principally to the powerful support which we have received from the Belgian Government. We owe it above all to the Minister of the Interior, **M. Piercot**, who has been our most constant friend (loud applause). This applause, gentlemen, proves to me that the proposition which I shall have the honour to submit to you will be equally well received. I propose that the Minister of the Interior be elected Honorary President of the Congress.

**M. PIERCOT**, the Minister of the Interior : Gentlemen, my first desire in being present at the opening of the Statistical Congress is to express to this assembly the sentiments with which I am animated by the honourable testimony which, in my person, the Government has just received from you. Permit me, gentlemen, to commence by thanking you for the cordial manner in which you have received the too flattering language with which the President has mentioned the aid afforded by the Government to your labours. I am also deeply sensible of the marks of esteem with which the whole assembly has accompanied the kind proposition of the President to confer on the Minister of the Interior the Honorary Presidentship of this assembly of science. I accept this high distinction with the most lively gratitude—less as a personal honour (which I cannot believe I have deserved), than as the recompense of those efforts which for many years the Government of this country has made, to create and bring to perfection the work to which you have thus assembled to consecrate your time and the fruits of your studies (applause). Gentlemen, after having expressed to you the sentiments which I deeply feel, permit me to submit to you a few rapid reflections, on the importance of your mission, and on the greatness of the objects which you henceforth pursue in common with the Central Statistical Commission of Belgium.

Suffer me first, gentlemen, to congratulate you, as members of

the Congress, on the generous devotion with which you have begun the work. In responding to the appeal of Belgium, you honour a country which has made it an invariable rule to cultivate, in the midst of peace and by aid of its happy institutions, literature, art and science, moral and political science—that science of administration which comprises within its compass the knowledge of all the mechanism of society.

Statistics—which, as you know better than myself, are calculated to throw a light on every department of government—have taken a high position in Belgium. Whilst all nations were forced by the progress of events towards social improvements, statistics became amongst us one of the first preoccupations of the Government of Belgium, after she had attained her independence. But, gentlemen, it is only justice to the members of the Commission Centrale de Statistique to state, that it is principally since the formation of that Commission that statistics have amongst us grown to such an importance as to render the most extensive services to the country—services of indisputable utility in all the measures which the Government is called upon to take for the development of the national wealth.

The decennial report, which has just appeared, and which we owe to the talents and devotedness of those distinguished men, exhibits the result of labours well combined; and shows what the spirit of investigation can effect, when it has great social interests in view, and above all when that spirit animates the minds of men of experience, uniting the habits of observation to the authority of science.

The most competent judges have hastened to signify their approval of the labours which the Belgian Government have ordered, and to which they have given the greatest publicity. Many foreign Governments, many learned Societies of different countries, have honoured these labours with their sanction. We have been happy, gentlemen, to observe the eagerness with which these Governments and learned Societies have sought copies of the great work which I have just mentioned. The report on the progress of the Belgian nation during the last ten years is now in the hands of the greater part of those men who have devoted themselves to the study of the science of administration, whether in our own country or abroad; and the time is not far distant (we hope so, at least) when every nation participating in the same feeling which has inspired the authors of the statistics of Belgium will desire to obtain a more perfect knowledge of their peculiar resources and powers, not only

as regards the material, but also the moral condition of the people. The science of statistics, devised in a spirit of uniformity, and resting on fixed principles common to all nations, is destined, you will agree with me, to extend its benefits to every country, and to throw new light on the real interests of Governments and the people. Thus understood, it cannot fail to result in drawing still closer the bonds which attach nations to each other, and to strengthen throughout the world those sentiments of fraternity and peace which in these days protect mankind against the return of national rivalries, so happily forgotten (applause). Such, gentlemen, are what we have understood, and these expressions of your approbation leave me no room to doubt they are what you understand, to be the objects of statistics. It is with this great social aim before us that we must endeavour henceforth to extend the domain of the science of statistics, and elevate it to the character of the true ideal of government.

The hopes which I express, gentlemen, on the progress and the result of universal statistics, are not far from being realized. This is the task which you have before you, and you will labour with success to accomplish it. Your presence here is a proof of the sympathetic interest which your respective countries feel in a science which cannot but have a powerful interest on their prosperity. It is also a sure sign, that you will receive from your Governments, whenever you shall feel it your duty to submit to them your views of the importance and vast utility of statistical labours, all the encouragement which a science of such varied extent, and which concerns alike the Government and the people, is entitled to obtain from them.

It remains for me, gentlemen, after this rapid glance at the labours which you are about to undertake, to congratulate my country on the choice which you have made of Belgium, as the first locality for your assembling. My country will respond, gentlemen, to the honour which you have shown us, by an hospitality which we trust to render worthy of you. I hope, that after the conclusion of the labours which devolve upon you, after having formed a closer acquaintance with Belgium, you will carry with you from this country the impression that here you are not only in a friendly land, which is prepared to profit by all the ideas which lead to moral and scientific discoveries, but that you are also amongst a nation of brethren, in which everyone is at liberty to discuss the great truths of social existence, in which everyone applauds generous sentiments, and whatsoever tends to lead men

to elevation of thought and to those studies which are destined hereafter to secure the happiness as well as the progress of nations (prolonged applause).

M. ARRIVABENE (Belgium): We have with acclamations appointed the members of the Provisional Committee to form the permanent Council, and in doing so I believe we have only rendered the homage due to those distinguished men. It is the custom in all assemblies of this kind to nominate Vice-Presidents; and we cannot do better than select them from amongst the members of the different nations who have done honour to Belgium by coming to take part in this Congress. I have consequently the honour to propose to you, as Vice-Presidents of the Congress—

Great Britain	.	.	.	.	MR. WILLIAM FARR.
France	.	.	.	.	M. VILLERME.
Prussia	.	.	.	.	M. DIETERICI.
Germany	.	.	.	.	M. MITTERMAIER.
Netherlands	.	.	.	.	M. ACKERSDYCK.
Spain	.	.	.	.	M. RAMON DE LA SAGRA.
Austria	.	.	.	.	M. LE BARON CZOERNIG.
Italy	.	.	.	.	M. BERTINI.

The proposition was carried unanimously, and the Vice-Presidents took their seats at the President's table.

The PRESIDENT (M. Quetelet) then pronounced the following discourse:—

“Gentlemen, in opening the Congress I will do myself the honour of explaining to you, in a few words, its origin and objects. Every one of you has doubtless been struck with the want of uniformity generally observed in the statistical documents of different countries, and of the impossibility in most cases of instituting comparisons between them. These discrepancies are the cause of a deplorable loss of time, and lead continually to errors of a most grave character. These inconveniences are too evident, and have been too often noticed by men of intelligence, to need being brought more prominently before you.

“It is acknowledged, on the other hand, that the surest method of giving an impetus to science is to perfect its language, and to adopt uniform notations; so as to comprise the largest number of ideas, and to bring together a greater multitude of facts from which to deduce relations and laws.

“These considerations, so simple and elementary, presented themselves with additional force at the time of the Great Exhibition of London—that universal bazaar, at which all the countries



of the civilized world united to display the wonders of their arts and industry. In the midst of these collected treasures, it was not only a confusion of languages which proved an obstacle to the interchange of ideas, but, above all, the difficulty of comparing so many things, and of trying by a common standard the productive powers and riches of so many nations.

“Struck with these inconveniences, a few friends of the political sciences felt the necessity of devising some plan of arriving, as far as possible, at an uniform language. Many of you, gentlemen, were in London at this period, and you will doubtless remember that it was then proposed to have special meetings for this purpose; but the preoccupations of the moment caused the proposition to be adjourned. It was agreed to meet at a later period, on a sort of neutral ground, between several of the principal States of Europe; and the rendezvous was fixed for Brussels. It was intended to take place in 1852; but political circumstances compelled it to be put off for another year.

“Unhappily, we shall see no more amongst us some of the principal promoters of this Congress, whose talents and experience would have contributed to throw so much light on our deliberations. It has not been permitted to Messrs. Porter and Fletcher, removed from the world of science by premature death, to be present at an union which they so ardently desired, and of which they fully appreciated the importance. We have equally to regret the absence of Mr. Kennedy, whom political events have removed from the position which he occupied with so much distinction in the United States, and who was also one of the originators of this Congress.

“The Central Statistical Commission of Belgium, depository of their thoughts, and encouraged by the support of men of science of different countries, accepted with pleasure the noble mission which devolved upon them. Henceforth, they neglected no means of arriving by the surest way at the end which they proposed. They consulted the experience of men of science who had devoted themselves specially to statistical researches; and it was only after being strengthened by their cordial co-operation that they laid the foundation of this Congress of peace. They were persuaded that the first efforts of such a reunion should be, above all, to introduce uniformity in the official statistics of different countries, so that the results might be compared together. Without this power of comparison, there could, in fact, be no progress expected in the science of observation.

"It was therefore a principal object that Governments should be interested in the project, and should appreciate its importance. The time appeared the more opportune, that the Belgian Government comprised several of the most enlightened advocates of political studies. Their hopes were not deceived. The Minister of the Interior and the Minister of Foreign Affairs readily interposed their good offices, and invited the foreign Governments to delegate to this Congress those heads of departments who were specially engaged in the preparation of official statistics. France, Great Britain, Austria, Prussia, Saxony, Bavaria, Wurtemberg, Switzerland, Piedmont, Spain, and Portugal, responded to this appeal, and have sent to us men of science, whose experience we shall be proud to consult.

"Several learned Societies, devoted to political studies, have likewise shown their sympathy with the objects of this Congress. Some have desired to be represented at it; and we gratefully record amongst them the Société Royale de Belgique, the Statistical Society of London, the Société d'Economie Politique de Paris, the Edinburgh Committee for the formation of an International Code of Commercial Laws, the Commission Supérieure de Statistique of the Sardinian States, the Société des Géographes de Florence, the Société de Statistique de Marseilles, &c.

"On the other hand, the provincial Statistical Commissions of this kingdom have not only sent delegates, but, in order to assist in the solution of one of the most interesting questions in our programme—that relative to the condition of the labouring classes—they have forwarded to us documents of the greatest importance, which will be submitted to your examination.

"It is only after an attentive study of the social system that we can comprehend its tendencies and its wants; it is only after carefully probing the wounds that we can propose the suitable treatment.

"Nothing can more completely display the universal accord with which the idea of the Congress has been received, than the simple statement of the fact that no less than twenty-six different countries are represented amongst the members present.

"In viewing this imposing assembly, we are happy in noticing another significant and important fact—the presence of a great number of the most distinguished political economists. Their presence here refutes the doctrine which some weak or superficial minds advocate, of a necessary divorce between statistics and political economy—between observation and science—which, on the

contrary, afford each other a mutual support, and throw light the one on the other. The science of statistics undoubtedly has been guilty of some vagaries—has lent itself to some abuses: by supporting false systems, or giving currency to preconceived ideas, it has undoubtedly sometimes strayed beyond its proper limits; but intelligent minds would never think of proscribing a science, and especially one newly created, because it has occasionally wandered from its true direction. Did not astrology for some time usurp the place of the true science of astronomy, and alchemy the rank due to that of Lavoisier and Berzelius? Every science has marked the beginning of its career by mistakes—often, by abuses to be deplored. It is not that the science of statistics has erred that should cause our astonishment, but that it should, at so early a date, have comprehended its mission and felt the necessity of regulating its steps.

“This Congress will, if I mistake not, be the beginning of a new era for statistics. The science is passing through the phases of other sciences, her elder sisters, who have felt the like necessity of adopting a common language, and of introducing unity and simplicity in their modes of research.

“A few days since, Brussels was witness to the opening of another Congress, having the same tendency, the same object, as this. It was, like ours, designed to bring into friendly relations the observers of different countries—to propose to them uniform methods to simplify their labours, and enable the results to be compared. Their object was the study of the great atmospheric and oceanic currents of the globe. Our researches are equally vast, equally elevated; our aim is to study, in another sphere of observation, the fluctuations of modern society, its currents and its shoals. May we successfully accomplish this noble mission; may we, like them, be privileged to serve the cause of science and the interests of humanity (applause).”

*(To be continued.)*

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*On some points connected with the Education of an Actuary. By  
H. W. PORTER, Esq., Assistant Actuary of the Alliance  
Assurance Office.*

[Read before the Institute, 28 November, 1853, and ordered by the Council to be printed.]

IN the paper I shall have the honour of reading to you this evening, upon some points connected with the education of an actuary, I shall endeavour to describe some of the more important duties and responsibilities of that office—to offer some observations to the student, as to his preparation for the profession of an actuary—and to suggest to the Council of the Institute some reasons for enlarging the sphere of the examinations that they may think proper to prescribe.

I shall not detain you with any account of the ordinary duties of an actuary, which are of course well understood in this room, but shall at once proceed to the consideration of the foundation of all actuarial knowledge—mathematics.

I believe it is now generally considered, that a very abstruse mathematical knowledge is not absolutely requisite for the general business of an actuary. I am not, however, prepared to coincide in the opinion of those who say that it is rather detrimental than otherwise, as we know of many instances which prove that the highest scientific knowledge and perfect business habits are not necessarily incompatible; but we also as certainly know that the prosperity of some Companies has been sacrificed to the closet meditation of the profound theorist—although it is right to add, that the success of others is mainly to be attributed to the sound principles which the master mind of the mathematician inculcated in their earlier stages, and the departure from which in their later career he knew would not be unattended with danger.

In the infancy of Life Assurance Associations, the directors, wisely acting upon the advice of the scientific man, were content to follow his recommendations; but modern experience shows that these gentlemen, though generally unacquainted with the theory of the business, are not at the present time so ready to bow to the dictum of their actuary; and one instance in particular may be adduced in support of this statement—when, on a recent occasion, a board of directors not only acted perfectly in opposition to the most proper advice of their actuary, but also ridiculed the prominence, phrenologically speaking, of his organ of caution.

Mr. Babbage, in his work on assurance, published in 1826, speaking of actuaries, says that “the degree of knowledge possessed

by persons so situated at the different institutions is exceedingly various, passing through all degrees, from the most superficial acquirements, derived merely from the routine of an office, up to the most profound knowledge of the subject." If this were true in 1826, how much more so it must be at the present time it is painful to contemplate.

An acquaintance, however, with the highest mathematics, is probably not essentially necessary for an actuary. It is quite true that in the determination of the law of mortality, and in the adjustment of mortality tables, high mathematics come into play with advantage, and cannot therefore be too sedulously cultivated; but such a knowledge of algebra as will enable a student to solve any question in arithmetical and geometrical progression, the summation of series, the theory of differences, and the less complicated cases in the theory of probabilities and the doctrine of chances (which necessitates of course a thorough knowledge of all the more elementary parts of algebra, upon which each and every one of these subjects depend), may, I consider, be deemed a good foundation on which to commence the study of the theory of annuities and assurances. Upon the necessity of a perfect knowledge and understanding of these and of all cognate subjects, I need not of course dwell; this is *par excellence* an actuary's business.

Let it not be supposed that I underestimate the value of mathematical knowledge. The mere study of this branch of science, apart from its direct usefulness, has the effect of promoting and improving our powers of judgment, of creating in us care and caution, and of indirectly producing those very qualities for which, I believe, actuaries are noted. Mathematics is undoubtedly the groundwork of all life assurance—at the same time the foundation upon which the superstructure is raised, and the concrete which binds together all the elements of the building; but, like that concrete, which originally is but an impalpable powder, it requires not only the application of other elements to render it useful for its intended purpose, but also the hand of the experienced artificer to direct its application.

Still, theory, however necessary to the actuary, is only one of his requirements. A perfect actuary should be a kind of "admirable Crichton."

He should, in the first place, have a good general education—such a liberal education as a university course provides. I do not mean that he should be such a proficient in the Latin and Greek languages as to be able to write a disquisition upon a disputed

reading, or a treatise upon a Greek particle, but that he should have a good useful knowledge of these languages. In these days, with the advance of science, new words are constantly being introduced into our language, and most of them from the Latin and Greek—more, perhaps, from the latter; and nothing assists the mind in the remembrance of scientific terms so much as an exact knowledge of their derivative meaning; indeed, without this, their precise signification can never be apprehended. In the science of anatomy, for example, without a perfect familiarity with the derivation of the terms in use, a student would be perfectly lost.

These remarks do not apply particularly to the business of an actuary, as generally understood; but to the cognate subjects connected with it they most assuredly do. For example: the directors of an Office observe, or seem to observe (for nothing is more fallacious than the impression sometimes conveyed to the mind by observation only, without recourse to a proper statistical inquiry), an unusual mortality from some particular disease, and request their actuary to prepare a nosological table of the causes of the deaths that have occurred in the Office. You may say, the medical officer is the proper person to make such a table. Granted: but a clever statist, with some knowledge of medical nomenclature, would be an invaluable assistant, at least, to the doctor. Now the medical certificates of the causes of death, required by the Registrar-General, invariably give the scientific name for the disease; and a man must be uncommonly well read, and must be possessed of a very tenacious memory, who, without knowing something of Latin and Greek, can interpret these (to him) cabalistic terms; but with a fair knowledge of the roots of the words, no one need be ever at a loss.

I could multiply examples showing the advantage of this kind of knowledge; but I am desirous of confining myself to the main object of this paper, the education of the actuary, and therefore shall say nothing on the subject of the gratification to be derived from classical reading, or of the solid advantages of a classical education—no unimportant sequence of which is what has been called the *γῆρασκειν διδασκομενος*, or the desire of learning as we advance in years, and which Urquhart, in his *Commentaries on Classical Learning*, says “is the ardent wish of every mind which has been improved by early culture, and is actuated by laudable emulation.” Further, a knowledge of the dead languages undoubtedly facilitates the acquirement of the living; and Assurance Companies are now extending their operations so much on the Conti-

ment, that an acquaintance with the French language, at least, is becoming daily more desirable, independently of its being a necessary part of the education of a gentleman.

To be enabled to advise his board upon the acceptance or rejection of doubtful cases, where the reasons for and against the acceptance of a life proposed for assurance are nicely balanced, or to determine the additional premium that should be required in a special case, an actuary should not be totally ignorant of the causes and effects of diseases; in fact, every man, of whatever profession, should have some knowledge of the physiology of the human frame. The opinion of the actuary often has, and very properly so, great weight with the directors; and the more, therefore, he knows of these subjects, the better.

Knowledge of this nature is particularly brought to bear in cases in which the calling of the life proposed is not of a very healthy nature, and particularly when this is the case in a life otherwise not perfectly unexceptionable; and affords the means of determining how far certain circumstances, in connection with others, may affect a life prejudicially. The effects of certain avocations upon different constitutions are well worthy of the study of the actuary. Some classes of workmen, as is well known, are liable to particular kinds of diseases, and are totally exempt from others; and it does not always happen that the popular ideas on these points are the true ones, as deduced from actual statistical inquiry. I would here mention a work by Mr. Thackrah, *On the Effects of Arts, Trades, and Professions on Health and Longevity*, published as long ago as 1832, but I believe little known to the profession. I am not aware of the existence of any other English book on this subject; but if Dr. Farr (who, I am given to understand, has in his possession ample materials for a work of this nature) could be induced to give us the benefit of his labours, such a work, from a man of Dr. Farr's reputation, not only as skilled in medicine, but as a statist, and, what is more, as an actuary (though not a professional one), would be a most valuable contribution to the library of an Assurance Office.

The mention of this gentleman's name brings me naturally to the subject of statistics, as to which Dr. Farr is an acknowledged authority. I will here venture to remark, that had this gentleman devoted himself to the business of life assurance, he would have been my *beau ideal* of an actuary, combining as he does medical knowledge with extreme statistical acumen, and the highest mathematical theory with an admirable talent in its practical application.

His writings on annuities and assurances, and the tables that accompany them, in the appendices to the Registrar-General's Reports, may be reckoned among the most valuable contributions on these subjects. I am proud that we are able to number him among the Honorary Members of this Institute.

I should wish here to observe, that as Dr. Farr is not a professional actuary, it is not invidious to select him as an illustration of my views of what an actuary should be; though it might be so considered, if I adverted to the qualifications of any other gentleman, who might equally realize my idea.

To return to statistics. This science is the very foundation on which the superstructure of life assurance is raised. To the labours of the statist we owe the compilation of the details from which the tables of mortality are formed; by his knowledge we are cautioned in respect of the acceptance or rejection of lives proposed for assurance, instructed as to the mortality we are likely to experience, and enabled to ascertain how far the mortality actually experienced exceeds or falls short of what we had been led to anticipate; and, finally, when our claims arise, we are enabled by the help of statistics to test the accuracy of our proceedings. Thus far does this science bear on the daily business of life assurance; but it has many other and far higher objects.

Leaving out of view upon the present occasion the necessity of statistical information to the legislature, with respect to education and the prevention of crime, I shall merely touch upon the subject in its relation to *our* interests—viz., as to the assistance to be derived therefrom in testing the efficacy of sanitary improvements, which, of course, greatly affect Life Assurance Companies.

At the last annual meeting of the Metropolitan Association for the Improvement of the Dwellings of the Industrious Classes, the result, as shown by Dr. Southwood Smith, so far outruns reasonable expectation as to be almost beyond belief. During the preceding five or six years, the improvement in the sanitary condition of the districts under observation had been steadily progressive up to the time of the report. The dwellings under the Association had been provided with efficient drainage and a good supply of water, while the cesspools had been removed; and the result was, that there had not been a single death from fever in any one of them since they were first opened, and that a barrier had been placed around them which this mortal pest of our towns and cities had not been able to pass, and thus the spread of contagious diseases entirely prevented.



The experience of the kindred establishment over which Lord Shaftesbury presides gives similar results, and the same may be said of the working of the Common Lodging-houses Act; in fact, in every district in which improvements of this kind have been carried out, in provincial towns as well as in the metropolis, these results have followed; and thus the direction in which our endeavours must tend, with the view to the amelioration of the condition of the lower orders, and their ultimate moral and physical redemption, is plainly indicated.

It falls within the province of the actuary to determine how far longevity may be influenced by such improvements as these, as well as by the discontinuance of intramural interment, by the establishment of baths and washhouses, and by other similar means. The change in the habits of the upper and middle classes, too, which has taken place within the last five-and-twenty years, in respect of temperance, and the custom now so general of living out of town, have no doubt tended to the extension of the term of life.

As to the legal portion of an actuary's duties, I have not much to say. I am aware of the legal aphorism, that "whoever is his own lawyer has a fool for his client"; but no one can be connected with a Life Office for any length of time without learning something, at least, of the routine of legal affairs—the more that can be learnt, of course, the better; and many gentlemen in this room must have had numerous opportunities in the course of their experience of observing how useful a clever actuary may be to the lawyer.

The model actuary, then, as a statist collects and arranges the materials for his mortality table; as a mathematician he constructs, accommodates, and corrects it, according to scientific principles; and from this source he calculates his tables of annuities and of premiums.

His knowledge of the nature of diseases, and of their effect upon certain constitutions and under different conditions, enables him to co-operate with the physician; and thus the medical knowledge of that officer is combined with the statistical element in the hands of the actuary, and the knowledge of both is thus made practically useful. His legal knowledge, if sound, may save the Company much expense—his sphere of usefulness is enlarged, and he becomes a valuable coadjutor of the legal adviser of his Company. As a scholar, the actuary is continually in request. As a man of business, his services are invaluable.

In the term 'business,' I include a knowledge of finance. In

this capacity, the actuary will have not only to advance the interests of his Company in every possible way, but it will be his duty to be ever on the watch for any change in monetary affairs which may possibly affect the future investments of the Company, or call for any alteration therein.

It will be his duty to protect his Company not only from all ordinary contingencies, but from all injurious and unjust legislative enactments. Unaided, he cannot do much in this respect; but by a zealous co-operation on the part of the whole body of actuaries, a great deal can be effected. In illustration of this, I need only refer to the valuable services of the actuaries in respect of the Income Tax, the Successions Duty, and the Friendly Societies Bills. With respect to the first, although the views of the actuaries were considered too complicated, and therefore not carried out, still there is, I believe, no reason to doubt that the evidence given by the actuaries before the Committee of the House of Commons led to the introduction of the Successions Duties Bill, that triumph of modern legislation. This Act in effect creates such a charge upon property as the actuaries have always advocated; the duties, however, being levied at uncertain periods and at varying rates, instead of at certain periods and at one unvarying rate.

The Bill, however, contained originally provisions of a character that would have been very injurious to many Assurance Companies, and particularly so to those which are in the habit of purchasing reversionary interests. The amendment of these provisions the actuaries have succeeded in procuring.

Their exertions in respect to the Friendly Societies Bill are well known; while as regards the question of assurance legislation now before Parliament, the public service they have rendered by their evidence before the Select Committee is incalculable, the result of which has been a report embodying a recommendation of some most wholesome and necessary provisions for the future regulation of Life Assurance Societies.

An actuary, moreover, should be a good accountant, inasmuch as the accounts of an Assurance Office are of a peculiar character, and sometimes involve very great niceties. He should also be a ready correspondent. He should be well read in all the literature appertaining to his profession, and should be prepared at all times to take advantage of any improvements that may enable him legitimately to extend the business of his Office, as well as to be on his guard against unsound modes of business; for though it is true that many Offices are rushing headlong into the most delusive

schemes, it is equally true that others are neglecting to take advantage of improvements of which the system of life assurance is fairly susceptible.

May I now be allowed to offer a few suggestions to those who may be preparing themselves for the profession of an actuary?

The students of the present day, it must be granted, have aids and advantages within their means which were totally inaccessible to those of some few years back. The numerous works on the subject of annuities and assurances which are now published render them in a great degree independent of their seniors in the profession; and through the medium of the Institute, a student, by hearing the various papers read and the discussions upon them, is enabled to obtain as much information in a few years as he formerly could do in a quarter of a century.

Before commencing the study of annuities and assurances, the student should have a thorough knowledge of arithmetic and of the elementary parts of algebra. - Arithmetic, if properly studied, upon rational principles, is as useful an exercise of the mind as geometry or logic. I would warn the student against neglecting the study of geometry, which, apart from its usefulness (though it has no direct bearing upon life assurance mathematics, and therefore not unlikely to be neglected), is an exercise of the mind by no means inferior to that of logic, and plays no inconsiderable part in developing and strengthening the reasoning powers, and in promoting the formation of habits of application and industry.

With respect to the study of annuities and assurances, it is to be regretted that no text-book exists which, although containing less than the noted work of the late Mr. Milne, while retaining the lucid explanations of Mr. Baily, might unite in itself the practical advantages of Mr. David Jones' work and the uncompleted book of Mr. Davies: for while, on the one hand, the work of Mr. Jones does not enter into the subject of three or more lives, Mr. Milne goes too fully into that subject for the beginner; and the confusion caused by the different notations used not only by each of the above, but by every other writer on the subject, is a great obstacle in the way of the student, if not a great inconvenience even to the practised actuary. The valuable contributions of Mr. Benjamin Gompertz on this subject are almost totally inaccessible. Now a compilation from the writings of Baily, Milne, Gompertz, Davies, and Jones, with the addition of the valuable tables of the latter, would be no less useful to the actuary than valuable to the student; the notation being of course assimilated—shall we say to that of

Jones, as being perhaps the most simple, and certainly the most *universal*. I will venture to throw out the suggestion as to whether arrangements might not be made for the preparation of such a text-book, under the auspices of the Council of the Institute, upon a plan somewhat similar to that on which the *Experience of Offices* was published in 1843.

The seniors of the profession will probably agree with me, that it cannot be too strongly impressed upon the mind of the student that the mere acquaintance with mathematical formulæ is not sufficient to make an actuary. I have before stated that this is only one out of many kinds of knowledge requisite. I will now go so far as to state my belief, that even in computations where the mere theorist might be supposed to be quite at home, it is not sufficient at once to adopt the numerical result arrived at by calculation. Those who have been in the habit of seeing that class of cases which arise in the private practice of the actuary, and particularly in that of the actuaries of Reversionary Investment Companies (and which are of a far higher order than the ordinary Assurance Office calculations), must be well aware that, in many cases, *judgment*, both as to the treatment of the case and as to the adoption of results when arrived at by calculation, or the modification of those results, is no unimportant aid to the actuary; indeed, cases may and do arise in practice, the result of which, untempered by judgment, would be absurd. Judgment and experience, which cannot be taught (the one must be inherent to a certain extent, and carefully fostered; the other must be acquired), are necessary as well in an Assurance Office as in a Reversionary Investment Company: and hence arises the necessity of an apprenticeship, if I may use the expression, to the business of life assurance; and it can hardly be doubted that this is no less necessary than in other professions, in all of which a certain probation is now required.

For the Institute, then, it remains to show to the world its fitness to be entrusted by the legislature with certain powers and privileges necessary to give weight and authority to its examinations; and probably the best method to make public the advantages it offers is to afford to its members voluntarily coming forward the opportunity of undergoing a searching examination by gentlemen of undeniable attainments in the several branches of education necessary for an actuary.

It might be desirable for the Institute to take steps to inform the boards of directors of the different Offices that such examinations have been instituted—the nature and extent of the tests

employed, and the description of reading requisite to prepare candidates for undergoing the examinations—and, further, to furnish lists of those that have passed the ordeal; it will then be within the means of every board of directors to secure not only qualified actuaries, but efficient clerks of a superior calibre. The examinations now prescribed by the Institute are three in number, each more difficult than the preceding; now it would be no great hardship to require that every clerk in a Life Office, being—say, 18 years old, should within two or three years from the date of his appointment be required to pass the first examination, and the succeeding two within intervals of not more than two or three years thereafter.

I merely throw out these suggestions as a groundwork to begin upon—of course the subject should be very fully considered before any steps are taken in the matter; but I think, now that Assurance Offices are being multiplied to such an extent, that it is ridiculous to suppose that all the *employés* are competent to be advanced to positions of responsibility; and I consider that a man who takes the management of the affairs of an Assurance Company, involving the social interests of thousands, is morally most culpable if he be not fully competent to the task he undertakes: and it is difficult to understand where many who have assumed these responsibilities have acquired their experience; and even a senior wrangler, without experience of life assurance, would be helpless in a Life Office.

The Council of the Institute labour under some difficulties with respect to the examinations, and they have evinced great judgment in the plan they have hitherto pursued. Being voluntary, they must not be made too difficult, or many will be deterred from offering themselves; nor must they be too easy, or the character of the Institute will suffer: but if it be desired that the Institute should take a high standing, and prove itself worthy to be entrusted with a charter of incorporation, I submit that more subjects should be introduced into the examinations. As they are now arranged, as far as they go they are probably sufficient: but I have shown, I hope, that something more than an acquaintance with mathematics is necessary for the education of an actuary; and I should be glad to see Mr. Jellicoe's views on these points more fully carried out, by the introduction of new subjects into the examinations, and by making it indispensable that a complete course of education should be gone through before the application of the final test. If some improvements of this kind were introduced, the plan of the Institute might become not only the

foundation on which a Government test might be raised, but probably the means of its introduction.

We shall find, in course of time, that as public attention is drawn to the matter, the profession of an actuary will be more looked up to than it is at present. The next generation of actuaries will, with the assistance of the Institute, be all competent men; and in time we shall see that no one will any more think of calling himself an actuary without a proper qualification, than at present he would call himself a physician or a barrister without having complied with the necessary requirements. One great advantage likely to be derived from the Institute examinations (quite apart from the necessity for them) is the test of competition, which alone will create a superior class of men.

Mr. Macaulay, in his speech in the House of Commons on the 25th June last, on the Indian question, bore testimony to the success of the test by competition, which, he said, had been proved by the career of those who took the highest honours at Cambridge and Oxford; showing that academical triumphs were not fugitive distinctions, but that it was the general rule that those who were first in the competition of the schools, were foremost in the business of life: and the *Times*, commenting on Mr. Macaulay's speech, added, that "the child is father of the man"; and that "the ardent spirit which distinguishes itself in the camp, in the council, and in the senate, or wherever it may be demanded in the field of active life, will generally be found to have distinguished itself at school and college, whether the competition be in Latin hexameters, or in the differential calculus."

I now conclude, with the expression of a hope that I may not be thought presumptuous in thus offering my views to the Council and members, inasmuch as I am solely actuated by a desire to see the position of the Institute improved, and the profession of the actuary proportionally elevated.

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"THE whole commerce of the country turns on contingencies which demand the application of scientific observation and calculation; and, as English agriculture has its chemists, English commerce must, to keep pace with it, ultimately employ actuaries to calculate the risks which are now only roughly guessed at, and thus extend the useful sphere of an important scientific class of men, at present almost peculiar to this country."—*Letter to the Registrar-General, by William Farr, Esq.* (vide 12th Annual Report).

*On the First Parliamentary Committee of Insurance; with Remarks illustrative of other facts connected with the History of Insurance.*  
By FREDERICK HENDRIKS, *Actuary to the Globe Insurance Company.*

[Continued from page 60.]

THE report in question also expressly stated that the petitioners did not desire the incorporation to be made exclusive in any respect of other persons or Corporations; and the consequence of which would be, that "their own interest would always bind them to do justice, and to act with candour and fairness towards the merchant, because, without that, they must forfeit their credit, which would determine the merchant to insure with others and not to deal with the Corporation."

The petitioners had fallen into the mistake of presenting their petition in the name of "The Governors, Assistants, and Societies of the City of London, of and for the Mines Royal, the Mineral and Battery Works, and for Assuring Ships and Merchandise." It was successfully contended, on the part of the private underwriters, that the insurance transactions which had been carried on for about seven months under colour of these two Corporations, whose real style ended at the words "Battery Works" (the words "*and for Assuring Ships and Merchandise*" being an addition of the petitioners), were illegal and unwarrantable; and the Attorney-General concurred in that view, and enlarged upon the dangerous consequence to the public, if charters granted for particular ends should be applied to others wholly foreign to their design. His Report was however intended to be favourable to the petitioners, who, it should be observed, had incurred the disappointment of an adverse decision on their first application for a charter, three years previously (*viz.*, in 1717).

The following paragraphs of the Attorney-General's Report are important, and contain finally a material reservation, which was not in the end acted upon:—

"But I do humbly certify your Majesty, that it doth appear that the design of the petitioners for a charter, in making use of the said old charters, was to make the experiment of insuring ships and merchandise as a Corporation; and that they have carried on that undertaking, though in that respect without legal authority, yet without any complaint from the persons with whom they have made insurances, or any objections to the fairness of their proceedings." "As to the matter chiefly contested between the parties—that is to say, whether it be fit for your Majesty to grant a charter

for erecting a Corporation with a large joint stock, for insuring of ships and merchandise—that, being a matter of the greatest moment to the general trade of the kingdom, deserves the most mature consideration; and it does appear, that insurance of ships and merchandise, being a public and national concern, has been in some measure under regulations, by two Acts of Parliament now in force—the first made in the 43rd Eliz., c. 12, the second in the 14th Car. II., c. 23.”

“But it is your Majesty’s undoubted prerogative, by letters patent under the great seal, if you shall think fit, to create a Corporation for the ends desired; and I am humbly of opinion that such a Corporation, *not being made in any manner exclusive of others*, and being granted under such regulations as are suitable to a matter of so great moment, may be of great advantage to trade; but whether it is advisable to erect such a Corporation with so large a joint stock as is mentioned in the petition may deserve particularly to be considered.”

The *Mines Royal* petitioners had, it is evident, early and sure information as to the error they had made in the style of their petition. They took the precaution, nearly two months before the date of the above report, to present a further petition, carefully avoiding reference to the *Mines Royal*, &c. charters, and signed by Lord Onslow, joined by 18 others, including Sir Justus Beck, John Bradly, &c., promoters, and, with the exception of Lord Onslow, signers, of the petition for the *Billingsley Insurance*.

The *Mines Royal Insurance* thus acquired at this stage the cognomen of *The Lord Onslow’s Insurance*. The fresh petitioners alleged, as before, that they and many other persons “had voluntarily subscribed a joint stock of one million one hundred and fifty-two thousand pounds, to assure the ships and merchandise of such traders as shall choose to be insured by them, and were the first that proposed and undertook this method of insurance.”

If we allow the full force of the conjunction between the words “proposed” and “undertook,” in the last sentence, we may then admit the priority of the claim of the *Mines Royal* or *Onslow Insurance* project, which acquired since the 22nd June, 1720, when it was incorporated, and at the present date (December, 1853) still bears, the name of *The Royal Exchange Assurance Corporation* ;\*

\* The first charter is dated, Westminster, 22 June, 1720; and the Corporation is therein styled “The Royal Exchange Assurance, for insuring Ships and Goods at Sea or going to Sea, and for Lending Money upon Bottomry.” The second charter bears date, Westminster, 29 April, 1721, and incorporates the persons in the first charter to be a



but it was not, however, the first body which *proposed* to carry on the business of marine insurance by a Proprietary Joint Stock Company. It appears that a scheme of the kind—and a very remarkable scheme it is—was elaborated in an almost perfect form no less than 224 years ago! The details of it are succinctly described in that important work which appeared in 1778, under the title of *La Richesse de la Hollande*;\* and as these seem to have been unknown to any writer on insurance, or, if known, not to have been noticed in any work on the subject, it will be desirable that such should no longer be the case.

It is stated,—I translate from the French of the work quoted—that, “The war which the Provinces of the Union had so long carried on against all the forces of Spain, and which had recommenced since the expiration of the truce, had cost the republic

Corporation for the Assurance of any Life or Lives, and against Casualties and Accidents by Fire, by the name of *The Royal Exchange Assurance of Houses and Goods from Fire*. (*Vide* Act 33 George III., c. 14.) Application is intended to be made to the Parliament of 1854 to consolidate the capitals under the two charters (*vide* Daily Papers, Dec., 1853).

\* *La Richesse de la Hollande*: 2 volumes quarto. Published nominally “à Londres, aux dépens de la Compagnie”; but really at Amsterdam, 1778. There is also a small octavo edition of same year, in 5 volumes; and a Dutch translation, *Leyden*, 4 vols. 8vo. To the question, “who was the author?” an answer requires consideration. On consulting Barbier’s vast labours in the cause of anonyms and pseudonyms, the information (?) obtained is worse than unsatisfactory, as may be imagined from this transcript, viz.:—“*La Richesse de la Hollande* (par Mich, ou Migt). Londres, 1778. 2 vols. in 8. *Nouv. édit., revue et augment.* (par El. Luzac et Bernhard.) Londres (Hollande), 1778. 5 vols. in 12.” Who *Mich* (or *Migt*) was, Barbier does not inform us; but the general opinion on the authorship of the work has been, that it should be ascribed to the Dutch jurist and philosopher Elie Luzac, nephew of the publicist who edited the *Gazette de Leyde*. The biographical notices of the Luzacs inserted in the *Biographie Universelle* are by Marron. These notices were reprinted separately in 1820, as a mark of their author’s friendship to the family. Speaking of Elie Luzac, he says—“*La Richesse de la Hollande* parut d’abord en français, en 2 vols., in 8vo.; 1778” (this is a mistake for 4to). “L’auteur en soigna lui-même la traduction hollandaise, et l’enrichit de plusieurs améliorations importantes. Leyde, 1780. 4 vols. in 8vo. C’est un histoire du commerce hollandais, où la théorie et la pratique sont également lumineuses. Un livre d’*Accarius de Sérionne*, imprimé à Amsterdam, 1765, 3 vols. in 12, sous le titre de *Commerce de la Hollande*, a servi de base à celui de Luzac, qui jugea que cette production laissait trop à désirer.”

Marron states that he was indebted for the information respecting Elie Luzac to the biography in the *Magasin Encyclopédique* for the month of August, 1813, written by Professor Henri Constantin Cras, of Amsterdam.

I have placed these details before the reader, as Mr. McCulloch mentions, in his *Literature of Political Economy*, that the work *La Richesse de la Hollande*, is, as well as *Le Commerce de la Hollande* (above cited), and a work entitled *Les Intérêts des Nations de l’Europe développés relativement au Commerce*, by “*Acarius de Sérionne*, a French littérateur, who died at Vienna in 1792, at a very advanced age.” McCulloch was acquainted with Marron’s views as to Elie Luzac being the author of *La Richesse de la Hollande*, but adds, that he had been assured by an eminent Dutch economist that this is an error, which most probably originated in the circumstance of Luzac having translated the work, to which he made considerable additions, into Dutch, and published it under the title of *Hollands Rykdom*, 4 vols. 8vo., at Leyden, in 1780.

The writer of the article on Luzac in the *Dictionnaire de l’Economie Politique* (Paris, 1853) dissents from this view, and says (*vide* volume ii., p. 610) that the work *La Richesse de la Hollande* is erroneously attributed to *De Sérionne*, and is really by *Elie Luzac*. The balance of opinion, up to the present time, is certainly in favour of the latter.

immense sums. Trade, it is true, had extended itself, and the riches it brought from the two Indies had placed the United Provinces in a position to confront their ancient oppressors; but the advantages of this very flourishing trade were not much felt except in the really commercial Provinces. The other Provinces, not possessed of the same resources, and obliged nevertheless to contribute their share to the support of the enormous burden of subsidies, applied themselves to the discovery of some means of diminishing, if only in part, the weight they had to bear. They conceived that commerce would supply them with this means; and wishing to flatter the merchants by the attraction, if not of an entirely free navigation, at least of an assured indemnity proportionate to the risks they had to run, elaborated the plan of a *General Chamber or Company of Insurance*. The States General presented this project in the year 1629 to the deputies of the various Provinces, and recommended especially to those of the Province of Holland to insist upon their constituents naming Commissioners from the body of the Assembly of their Province, to examine this plan, to give the reasons for their refusal to accept it, and to hear the motives which induced the other Provinces to urge its acceptance; "and because," said the States General, "they were persuaded that, this Company or General Chamber of Insurance once put into train, the merchants could carry on a much securer trade by sea than heretofore; and that, besides, it would afford a means of releasing the Provinces from the large extraordinary subsidies, which the latter declared they could no longer continue."

The particulars of the projected Ordinance were thereupon drawn up by the States General, and referred to the Commissioners. The clauses of the project are very voluminous, and fill many quarto pages. It will, however, be sufficient for the present purpose to notice — That the plan of insurance was to be made compulsory, under pains and penalties of the severest nature—That it provided for specific rates of premium for voyages to and from the chief foreign ports\*—That the proprietors and directors were to be

\* The rates of premium are as follow :—

For the Sound and Norway, must be paid, if the voyage be made in summer—i. e., from the 1st April to the 1st November— $2\frac{1}{2}$  per cent.; ditto, for the winter season—i. e., from the 1st November to the 1st April— $3\frac{1}{4}$  per cent.

For Bergen in Norway, Drontheim and Stavanger—in summer, 3 per cent.; ditto in winter,  $3\frac{1}{4}$  per cent.

For Muscovy, outward bound,  $3\frac{1}{4}$  per cent.; for homeward bound, or return, 4 per cent.

For Greenland and Spitzbergen, 3 per cent.

For Hamburg, 2 per cent.

For Emden and Bremen,  $1\frac{1}{2}$  per cent.

responsible to the extent of their subscribed shares—That the States General were to subscribe four millions of florins, two-thirds on account of their share in the risks of profit and loss, the remaining third being ceded as a gift to the Company—That there are statutes laying down the manner in which the funds were to be invested at honest interest, with minute regulations as to the number of offices and agencies, officers and their salaries, general and special meetings, &c.—That, finally, there follow clauses establishing the Company as a Trading as well as an Insurance Association, and intended to give it the monopoly of the Dutch trade in the Levant; with powers similar to those enjoyed by the East India Companies, as to making treaties of commerce, building forts, establishing governorships and officers of war and justice, levying of troops for the protection of the Company's trade (the States to grant the use of 20 ships of war, 4 frigates, &c.); in fact, that all the general rules are laid down which seemed necessary for the proper conduct of the proposed Company during its concession of twenty-four years' power.

The plan was thus not only for an intended Insurance Institution, in the ordinary acceptance of the term, but combined with it

For Scotland, Newcastle, and Hull, and their neighbourhoods,  $2\frac{1}{2}$  per cent.

For the Thames,  $2\frac{1}{2}$  per cent.

For Plymouth to "*La Pointe de l'Angleterre*" (query: Land's End?) inclusive, 3 per cent.

For Ireland and its neighbourhood, 5 per cent.

For Nantes, La Rochelle, and the neighbourhood,  $4\frac{1}{2}$  per cent.

For Bordeaux, 5 per cent.

For Bayonne and St. Jean-de-Luz,  $5\frac{1}{2}$  per cent.

For Saint Malo,  $3\frac{1}{2}$  per cent.

For Caen, Havre, and Rouen, 3 per cent.

For Dieppe and Calais,  $2\frac{1}{2}$  per cent.

The premium and assurance ("*La prime et l'assurance*." Query: misprint for "*La prime d'assurance*"?) are the same for the return voyage from these different places to the Provinces (of Holland), provided that the vessels or goods have been duly reported, and in the manner laid down in the preceding regulation.

Vessels or merchandise going to Toulon, Marseilles, Genoa, Leghorn, to be insured at a premium of 10 per cent.

For Venice, the premium to be 13 per cent.

In the next statute, notice is given that the surrounding neighbouring places of the Channel (*in de Straut*) are not included in those above mentioned, and that the Company is not bound to insure except for the localities above specified.

All other vessels or goods sent towards the west, to the more distant capes, cannot be insured beyond the Land's End (query: *ut sup.*) of England, and the premium to be 3 per cent.

If the voyage or transport be toward the Baltic, and for places at a greater distance than those above designated, insurance will be made to the Sound inclusive, and the premium will be  $2\frac{1}{2}$  per cent.

In the same manner, one can insure as far as the Cape of Hitland (?) vessels and merchandise forwarded to the north, at a premium of 3 per cent.

As this plan was conceived in time of war, and as the Dunkirkers then infested the sea with their piracies, one half per cent. extra is granted to the Company for three years upon the premiums above quoted, and 1 per cent. for the places in the Channel before designated in the project, in order to reimburse it in some degree for the losses which it may undergo, and the great expenses it will have to sustain.

an advised scheme for the consolidation of the naval and commercial system of Holland. Although it would be idle to give much consideration to what *might have been* the results, had the whole plan been carried out, a passing thought suggests itself of the great importance which this insurance project would thereby have had in affecting the position of the Dutch in keeping head against the growing successful rivalry in trade of other nations, and in thus influencing to a material extent the general politics of Europe.

We learn that the commercial towns and Provinces vigorously opposed the measure each time it was broached by the other interior Provinces, less interested in navigation. Whilst the latter Provinces, on the raising of any subsidy for naval purposes, called attention to their favourite insurance project, "which would," said they, "of itself suffice for the surety of commerce and navigation," the maritime Provinces (and particularly the Province of Holland) had the ready answer, "that industry, zeal, and application were the best supports of commerce; and that such a Company supplying the same advantages to the negligent and ignorant trader as to the skilful and industrious merchant, it could not but be to the detriment of commerce in general."

It is then observed, that the merchant class, whom the insurance project seemed particularly to favour, were amongst the first to remark to the States General upon the inconveniences which, it seemed to them, would result to commerce, and thence to the republic itself. Commissioners were then delegated to ask the advice of the merchants upon the plan; but were not contented with the verbal reply of the latter, who therefore, in the same year, presented to the States General a memoir alleging the various reasons why the project of the General Insurance Company ought, in their opinion, to be rejected. This report did, in fact, lead to the rejection of the plan; and whilst there is reason for our assuming that the convictions of the merchants were more induced by their own interests than by any idea of whether the project would be useful to their country, there is, at the same time, much that is worthy of remark in the eminently *practical* way in which the merchants seem to have decided on the important point referred to them.

I make no further apology than the interest of this document for the length of the present digression being increased by its insertion; and need only premise that I have translated it from the sole form in which I have access to it—viz., the French version of Luzac.

"HIGH AND MIGHTY LORDS.

"*The merchants summoned by order of your High Mightinesses to give their counsel and evidence whether it would be advantageous to the republic and to the inhabitants of the United Provinces to carry out and publish the project of an Insurance Company which has recently been devised, have (saving correction) verbally explained to the Commissioners the reasons why, in their judgment, it is not expedient to found such an establishment under present circumstances,\* but that for the safety of the sea the protection of the public administration is to be relied on. Nevertheless, the Commissioners, deeming that this verbal declaration would not satisfy the objects of your High Mightinesses, and having demanded that the persons summoned by your High Mightinesses should examine the said project clause by clause, and that a collective report should be prepared upon the whole subject—which being received and considered in due season and place, a statute such as might be agreed to should be founded thereon—we have consequently met together at various times, weighing to the best of our power the reasoning brought forward on both sides—have read and reperused the clauses of the project—but have unanimously determined, that the establishment of such a Company would be disadvantageous to the general commerce of these Provinces and burdensome to the different branches of trade in particular, and to that which is more especially devoted to the fitting out and freighting of ships. Because, as far as respects the vessels, it is notorious that during the war they have been built, and are still daily built, in very great numbers and of the best construction; and that although the expenses which they require, increase from time to time, through the dear-ness of the materials, workmanship, and other items, one is nevertheless obliged to take the loadings at a low price; because it is more and more perceived that the freighting of ships is resorted to in other countries and kingdoms, and that the French, English, and Scotch, become carriers of their own merchandise, and even of ours, for the same price as, and often, moreover, at a cheaper rate than, the vessels of these Provinces are able to do. Therefore, if our vessels are further overcharged with the premium of insurance fixed in the project, they would become obliged to remain useless in our ports, and principally the best fitted and well constructed vessels; in lieu of which, no others would be seen in these Provinces than pinks (flutes) and barques, or bad and old ships, the proprietors of the said ships not being obliged to fit them out in war time, but the insurance having to extend to all.*

"*What reason can be imagined for overburdening in this fashion the navigation of the northern seas and of the Baltic, when we know that it does not actually return one half of what would have to be paid to the Company for its insurance; and moreover, that this navigation is at the present time sufficiently secured by the vessels of war of the republic, and by the provisional arrangements of your High Mightinesses, for us not to have much to fear on the part of the enemy?*

"*The freight business being, besides, of a nature to be divided into several small branches or sections, of which each would willingly bear its risk, the damage which might arise is easier borne than to see oneself overcharged with*

\* The republic was still in the height of the war with Spain; and the celebrated *Peter Hein* had in the preceding year (1628) captured from the Spaniards the fleet which, on account of the amount of treasure which it carried, was called the silver fleet (*de zilvere vloot*). E. L.

*the projected tax, or to be obliged to retain one's own vessels in the harbours, and thus leave the sea open to foreigners alone.*

*"What troubles, what vexations, will there not daily arise respecting the taxation (or rating) of these vessels, for the premium to be levied! and what equality is there to be hoped for, when, to obtain it, attention will have to be given to infinite diversities? Some of them will be old ships, others new; these will be well fitted out, those badly so; and a thousand other such differences, which each will interpret according to his own idea and to the greatest advantage to himself. Might it not even occur that this would often lead to such great jealousies between the towns and provinces (each of them being naturally disposed to labour for the special advancement of its own commerce and navigation), that complaints would be carried, not only to the respective tribunals, but even to the assembly of your High Mightinesses? and may God grant that these differences and quarrels are not pushed to such a point as to make it wished that the formation of such an establishment had never been thought of!*

*"As regards merchandise, no one is accustomed, particularly in such times, when trade is so dejected, to have insured the goods which he sends to or receives from abroad—if, at least, it be not a cargo of considerable value, much above what one is used to risk, or that one does not find an opportunity of dividing it among several vessels. In the latter case, it sometimes happens that a merchant who is obliged to load on board a single ship, endeavours to diminish the risks which he runs, by effecting an insurance.*

*"Several goods are, besides, of a nature which cannot be subjected to this tax: for there are many which are only passed through this country as by a canal, to export them hence to other parts; and thus, by passing without stopping, the State will be forced to lose the entry and exit dues, and the inhabitants their trade. Salt and French wines are already sent directly into the Baltic, without entering these Provinces. It is the same with several products of Muscovy, which are forwarded direct into Italy and France; and soon the same reasons will also cause the silken stuffs and other valuable merchandise, which still come to us from Italy, Smyrna, and other places, to take another course, in order not to touch at our ports.*

*"Solely to prevent trade being diverted elsewhere, your High Mightinesses have heretofore wisely reduced the entry and exit dues upon certain goods—for instance, on potash, talc, furs, wools, &c.; so that it is certain that there are goods, which, having regard to the places whence they are obtained, and to their essential nature, cannot be subjected to the projected impost. Even those which are consumed in these Provinces, were they otherwise susceptible of some such a tax, could not, in the case in question, be separated from the other objects of commerce.*

*"The manufactures through which so many towns and inhabitants of these Provinces flourished are already cultivated in other kingdoms and countries, to the misfortune of so many thousands of persons, whose subsistence they formerly provided; and what must we expect, if they also be subjected to the projected tax, but to see numbers of workmen and artists desert, and those reduced to misery who cannot follow them, and who are forced to gain their bread by labour?*

*"These reasons, and several others, do not allow us, High and Mighty Lords (saving correction and better counsel), to advise the putting into execution the projected plan of an Insurance Company; but much rather do we humbly beg*

*your High Mightinesses to be good enough to continue to secure the sea by public means, and by your authority, for which so many excellent resolutions have heretofore been taken; and it will be by restoring these to force, that this State and its faithful inhabitants will find, by the blessing of God, repose and surety both at sea and on land."*

Reverting to the subject of the English Parliamentary Committee on Insurance (*anno* 1720), the next document to be referred to is the petition for incorporation of the Assurance Company known since the 22nd June, 1720—i. e., from the same date as the Royal Exchange Assurance Corporation—as "*The London Assurance for insuring Ships and Goods at Sea or going to Sea, and for Lending Money upon Bottomry*," and subsequently as "*The Corporation of the London Assurance of Houses and Goods from Fire*."\* Previously to the above date, the project had been named either "*Lord Chetwynd's Insurance*" (from that nobleman heading the petition), or "*Ram's Insurance*" (from Mr. Stephen Ram, who, with Mr. James Colebrook, was banker to the subscription list). The petition is a pithily-worded and straightforward one, and is short enough for quotation in full:—

"TO THE KING'S MOST EXCELLENT MAJESTY.

"The humble petition of several of your Majesty's loyal subjects, merchants of the city of London, and others; sheweth—

*"That your petitioners, being sensible of the great security and many other advantages that accrue to trade by insuring ships and merchandise in Corporations, and being themselves a very considerable part of the body of merchants on the Exchange of London, and the persons that pay the premiums for such insurances, have entered into a voluntary subscription to raise two millions of pounds sterling as a joint stock, to enable them to insure both their own estates and those of other merchants and traders. They therefore humbly pray your Majesty to grant them your most gracious letters patent, to incorporate them by the name of "The Merchants' Society for Insuring Ships and Merchandise," with such powers and restrictions therein contained as to your Majesty in your great wisdom shall seem proper.*

*"And your Petitioners, as in duty bound, shall ever pray."*

Lord Chetwynd's, Sir William Chapman's, and 512 other signatures, are appended; and it is to be remarked that the latter include the great body of the families of those foreign refugees which this country was fortunate to number among its citizens after the short-sighted revocation of the Edict of Nantes.

The Attorney-General reported upon this petition two days

\* By an Act passed in Her present Majesty's reign, this Corporation has now the shorter name of "*The London Assurance*." The original style of the Corporation as above given, passed, in a similar way to that of the Royal Exchange Assurance (*vide* Note, *ante*), into that of the second style above named, by supplementary charter.

after the date of his report on the Mines Royal project, and included, as usual, full specification of the arguments for and against. The subscription list set forth that the "subscribers agreed to pay 17s. 6d. per £100 in money, together with a receipt of 2s. 6d. of either Mr. Stephen Ram or Mr. James Colebrook (*which receipts were given lately by them for former subscriptions*), which, together, will make £1 per cent., and is in part of each £100 by them then subscribed;" and the sums so received were to be lodged in the Bank of England.

Some of the adverse petitioners objected that the project was more with a view to stock jobbing than the advantage of trade. To this it was earnestly answered, "That no such design could be reasonably suggested; because it appeared now, from the several petitions, and the great numbers of the most eminent traders who had either subscribed or certified in favour of such a charter, that the weight of the sense of the best merchants, who were most interested in trade, was for such a charter, and who could not be charged with so sinister a view as that of stock jobbing without giving up the interest of trade itself, which was of more consequence to them than what could arise to them from the advantage of stock jobbing."

The substance of the Attorney-General's summing up is, that the sense of the greater part of the merchants of the city of London was in favour of the incorporation prayed for; but that his own opinion was that the ends of trade would be sufficiently served by a far less joint stock than that proposed, of two millions sterling; so that "any misapplication which might otherwise be made of such joint stock to purposes different from that of insurance of ships and merchandise, and which may be of great inconvenience to the public, would be thereby prevented": but that, if his Majesty should be graciously pleased to erect such a Corporation, under proper regulations, it would be by no means advisable to create two or more Corporations of that nature.

As far as its wording is concerned, the next petition borders on the ludicrous, and is rather a curiosity in its way. It runs thus:—

"TO THE KING'S MOST EXCELLENT MAJESTY, IN COUNCIL.

"The humble petition of several merchants, whose names are hereunder written, in behalf of themselves and many others who have voluntarily subscribed to a joint stock of one million sterling, for insuring ships and merchandises; most humbly sheweth—

"As the glory of the English nation hath been more enhanced since your Majesty's happy accession to the throne than by any of your royal



predecessors (as is most perspicuous), in giving bounds to Europe by your consummate councils and victorious arms; there can be no room for doubt of your Majesty's royal intentions for the next great blessing to us, our trade; and as it is certain that the riches of this kingdom doth solely arise from that, so nothing can contribute to the enlargement of it so much as by securing the shipping of the merchants by an easy and safe insurance."

The concluding part of this petition (which is signed by John Merrys, Samson Gideon, and 70 others) then proceeds with reference to some quarrel, about the subscription list, with a Mr. Helbut, and no less than seven folio pages are taken up with the affidavits of witnesses and the report of the Attorney-General upon it. The particulars are not of any present interest.

The petition which follows partakes of a politico-commercial nature, and is from the Earls of Westmoreland, Uxbridge, and Delarane; Lords Percival, &c.; the Bishops of Bangor and Bristol; followed by mercantile folks, such as Sir Justus Beck, Sir Gregory Page,\* the Billingsleys and Bradlys (again), and, to use the words of its recital, "by several hundreds more of his Majesty's faithful and loyal subjects." It sets forth—

"That your petitioners, considering the great difficulties and discouragements the Commissioners of the Forfeited Estates have laboured under from the enemies of your Majesty, and how much the public has suffered for want of such as had money and courage to purchase them:

"That it will unite many of your subjects against the Pretender and all his adherents for ever, to have those estates vested in a body of men who will always think it their interest to do all they can for the service of your Majesty's sacred person and government; several of your petitioners encouraged persons from England to go to Scotland and purchase the forfeited estates lately sold there, and have since, by a voluntary subscription to the Governor and Company of *Undertakers for raising Thames Water in York Buildings*,† raised a joint stock or fund of £1,200,000 sterling to

\* The reader is presumed to be acquainted with the peculiar features in the history of the times when these subscription lists, and those of countless other projects, were formed, and engrossed the attention and cupidity not only of the trading classes, but of kings, nobles, clergy, and even of the fair sex, who had their 'change hours in London, Paris, and Amsterdam. In the latter city there seem to have been almost as many insurance projects as in London. The book entitled *Het groote Tafereel der Duwaasheid, &c. &c., zynde een Verzameling van alle de Conditien en Projecten van de opgerechtte Compagnien van Assurantie, Navigatie, &c. &c. &c.* (1720, folio), contains particulars illustrated by highly satirical plates, designed in a way that a Hogarth would be proud of, and in one of which (by the celebrated engraver *Picart*) the various insurance plans figure with others in a well-composed allegory. The style of thought induced by the period of the *renaissance*, and perpetuated in the days of the Charles's and of Louis Quartorze, made people less prosaic than now, even in their commercial ideas; and the Muse (rather a slipshod one, it is true) was not unfrequently invoked to plead the cause of insurance projects. She sometimes, however, endeavoured to make her voice heard against them; as witness a piece of poetry in the *London Journal* of the 9th April, 1720.

† It appears in evidence, that King Charles the Second, in the 27th year of his reign, had by letters patent granted to Ralph Bucknall and Ralph Weyne, their executors, &c., power to erect a water-house in York House Garden, and to lay pipes into the river Thames, and convey the same for the use of the inhabitants and adjacent places, under

purchase such and other estates, upon the credit of which they propose to grant *annuities for life* to such of your Majesty's subjects as are straightened in their fortunes by the reduction of interest, whereby the annuities formerly granted by Parliament (which are the most difficult of all the public debts) may be more easily redeemed; and your petitioners also, with the same fund, propose to *assure lives*. Your petitioners have hereby raised the envy of those who are not so well affected to your Majesty; and, to make the undertaking of no value to your petitioners, are, after them, endeavouring to set up another Company, a little to imitate your petitioners.

"Your petitioners therefore humbly pray your Majesty will be pleased to grant them your royal letters patent, to incorporate them by the name of *The Governor and Company for purchasing and improving Forfeited and other Estates* in Great Britain, *for granting Annuities for Life, and for Assuring Lives*, according to the annexed heads for a charter; or by such other names, and with such other powers and privileges, as to your Majesty's great wisdom shall seem meet: your petitioners not desiring to exclude private persons from purchasing and improving estates, granting annuities, or assuring lives, as they have hitherto done, nor to meddle with the business of any other Corporation.

"And your petitioners, as in strictest duty bound, shall ever pray for your sacred Majesty."

The substance of the rival petition referred to in the above, deserves quotation in full, as it will be seen to contain in a few sentences quite as much in favour of life insurance as need be suggested, without that amplification as to its virtues, with which modern insurance handbooks and essays-recommendatory abound to satiety.

The petitioners in this case were Sir James Hallet and 113 other merchants, &c., subscribers to a "Fund of £1,200,000, for granting Annuities, securing Fortunes to Widows, Orphans, and others, settling Jointures on Marriages, and *Insuring of Lives, &c.*" These parties averred—

"That it will be of very great advantage to the widows, orphans, and other subjects of these your Majesty's dominions in general, could they have a safe and satisfactory security to resort to for purchasing annuities, whereby to improve their small fortunes, and enable them to live comfortably without either becoming burdensome to their friends, or by time to waste their capital, and be thereby reduced to poverty and want:

"That it would also be of great advantage to the subjects of these His Majesty's realms, especially such of them as are in trade, to use in such their trade the greatest part of the fortunes they may receive with their wives; and which they might much the better do, could they, by laying out some part of the said fortunes, secure a sufficient competency for their wives to live and subsist upon, in case they should, by the chance and hazard of

the name of the Corporation above referred to, with legal power to purchase and retain land, &c.; and that Case Billingsley and Brady entered into negotiations, in concert with Sir William Thompson and others, for the transfer of the rights of this Corporation, for a valuable consideration (£7,000), to the Forfeited Estates and Insurance project.

trade, either fail or die, without a capacity to make any other provision for them:

“That it would also be very serviceable to His Majesty’s subjects, could they safely and securely insure upon their lives; which would encourage merchants to be more bold in their undertakings, because, in case of their death before their schemes in trade succeed, their widows and families might thereby receive a benefit in a great measure to recompense the failure of such their undertakings: That persons in good offices and employments for life may, for the same reason, be induced to make provision for their families, who during their lives have an opportunity of maintaining them in good credit, but at their death very often leave them in slender circumstances.”

*(To be concluded in our next Number.)*

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*Report of the Select Committee on Assurance Associations (1853).*

IN the last Number of this Journal\* we undertook to call the attention of our readers to that part of the evidence given before the above-mentioned Committee which had led to the observation in their Report that “considerable difference of opinion prevailed amongst actuaries themselves on the subject of their being formed into an incorporated Society, with a view to the issue of diplomas or certificates to persons qualified to practise as actuaries”; and accordingly, on publication of the evidence we took an early opportunity to peruse it, in order to discover what had given rise to the assertion in question—that so we might correct any false ideas of our own, or expose the fallaciousness of those put forth by persons holding a contrary opinion. In this investigation, however, we have been agreeably disappointed; since, after a tolerably careful perusal of the ponderous volume containing the “Minutes of Evidence,” we have not been able to light upon any passages condemnatory of the proposed incorporation; on the contrary, all that is said on the subject is strongly in favour of such a measure. The difficulties attending the carrying of it out, it is true, are more than once spoken of; but that is a very different thing from opposing it.

On reference to the evidence, it will be seen that what is here stated is fully borne out. Thus the Chairman of the Committee and Secretary to the Treasury, Mr. James Wilson,† asks (*see* question 3708)—

\* See note at foot of page 32 of the last Number.

† Whatever may be thought of the results of the Committee’s labours, there can be but one opinion as to the part taken by this gentleman in them. The patience, strict

"Do you not think it very desirable, when so much intricate and fine scientific knowledge is requisite in the conduct of the business, and when so much depends on the qualifications of the actuary and the advice he gives to his directors as to the ultimate security of the undertaking, that there should be some security to the public that those who profess to be actuaries really do understand their business?"

And again (question 3711) :—

"Is it not the case, that this particular kind of information, this particular quality of mind, has in all our public institutions, universities, and public schools, been entirely or very much neglected; and would it not be extremely desirable if the public attention, by constituting such a profession, could be more immediately called to it in our great public schools, so that men as a branch of liberal education would acquire what may be termed the scientific education of the profession of an actuary?"

Again (question 3717) :—

"If I understand the scope of your observations, the duties of actuaries are likely, in the common course of civilization and the extension of commerce and social institutions, to become extremely extended, and to ramify themselves into a hundred forms which perhaps we cannot at the present moment contemplate or conceive. Suppose there were to be a profession of actuaries, such as other professions, involving some test on originally entering it; do you (not?) conceive that that would be for the actuaries themselves, and also for the institutions they manage, an immense security in future?"

Again (question 3721) :—

"Do you think really, that men of sense, men who saw a great public object in laying the foundation for a profession of such importance—however high their abilities might be, however unrivalled they might be, and whatever reputation they might have acquired—would object to go before a certain board of men and to answer certain questions, when they knew that it was not really for the purpose of ascertaining their qualifications, but when they knew it was for the purpose of giving effect to a common rule?"

These and similar questions frequently recur; and are always, so far as we can find, answered affirmatively :—

"If a test could be accomplished, it would be very desirable." "Nothing more desirable, in the monetary state of this country. The functions of an actuary are frequently of a most important nature, and are not now rightly understood." "If the Government took the matter up in a proper spirit . . . by some management and a little patience they could practically contrive to get over many of the difficulties, especially if the leading actuaries, the older men, who would have weight and influence, would assent to the views of the Government, and co-operate with it . . . Much good

impartiality, and courtesy, with which he conducted an inquiry at times most tedious and uninteresting, were only equalled by the rapidity with which he seized the ideas of the several witnesses, and extracted from them, in the least possible time, the greatest amount of useful information.

might be accomplished in that way." "The incorporation would give a status as well as a pecuniary recompense to those who enter the profession."

And so on.

Thus it appears that, on the face of the evidence, there is no difference of opinion as to the desirableness of the measure, although there may be as to its practicability; and we are hence led to the conclusion that this is what the Committee really mean—viz., that a considerable difference of opinion prevails amongst the actuaries themselves as to the practicability of the measure.

We scarcely think the Committee have sufficient ground for even this statement; but should it be so, the fact is not very material. The practicability or impracticability of a thing can only be fairly tested when the trial is actually made; and we are not at all fearful of the result, if that stage of the business can once be effectively attained: provided always that no opposition arise from amongst the members of the profession themselves—a contingency we can scarcely, under all the circumstances of the case, contemplate as probable. Meanwhile, it is at least satisfactory to observe the progress which has been made within the last three or four years, or since the formation of the Institute, in obtaining for the profession a better recognition of its claims than has existed hitherto. The impression made on the mind of the general public is perhaps not great; but the Government evidently begins to appreciate the peculiarity of its powers, and the wide sphere over which its action can be usefully exerted; and since it is to the Government that the profession must look for the legislative aid necessary to the attainment of a more independent position, such appreciation on their part is, it must be admitted, of no small importance.

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"THERE is so much of peculiarity in every Assurance Society, and such skill required in determining what charge should be laid on the net premium, what reserve should be laid up, what constitutes the safety of a particular Office, what should be sacrificed to extend the transactions, what should be strenuously resisted to save a Society from imminent danger or insolvency, and what should be adopted to give families the greatest benefits, the public the greatest confidence, in Insurance Societies—as demand from the actuary great technical and mathematical skill, besides integrity, consummate judgment, courage, and prudence."—*Letter to the Registrar-General, by Wm. Farr, Esq. (vide 12th Report.)*

## NOTES AND QUERIES.

MR. JAMES MEIKLE, of the Scottish Provident Institution, sends us the following method by which, as he says, a very close approximation may be made to the rate of interest in a life annuity.

Let  $A'$  be the annuity of which the rate of interest is required;

$A$  an annuity near to the above, at a known rate of interest;

$$\text{Then } A' = AE \frac{\Delta v \cdot S_x}{v \cdot A \cdot D_x};$$

$$\therefore \Delta v = \text{Log}_e \left[ \frac{A'}{A} \right] \cdot \frac{D_x v \cdot A}{S_x}.$$

The value of  $\Delta v$  will be slightly short of the truth; but the following examples will show the extent of the error:—

$\Delta v$  by the above formula, between Carlisle 4 per cent. and Carlisle  $4\frac{1}{2}$  per cent., at ages

$$\left. \begin{array}{l} 90 = 0045958 \\ 60 = 0045638 \\ 30 = 0045121 \\ 0 = 0044864 \end{array} \right\} \begin{array}{l} \text{so that the error} \\ \text{is only} \end{array} \left\{ \begin{array}{l} \cdot 0000049 \\ \cdot 0000369 \\ \cdot 0000886 \\ \cdot 0001143 \end{array} \right.$$

$$\text{True value} = 0046007$$

We have also, from the same gentleman, a method of determining the rate of interest in a life annuity when the table of mortality and age only are given; for which, however, we must endeavour to find room in a future Number.

ASSURANCES are becoming frequent on one life against another, and for  $n$  years longer. The following is a simple means of approximating very closely to the annual premium for such risks.

Let  $p$  be the annual premium for assurance of £1 on the life of  $A_x$  against that of  $B_y$ ; find the number of years they may expect to continue in being together, and call it  $z$ ; let  $s$  be the single premium for £1 assurance on the life of  $A_{x+z}$  for the term  $n$ : then the annual premium required will be  $p+p's$ ,  $p'$  being that for assurance of £1 on  $B_y$  against  $A_{x+z}$ . Of course the payment of premium will here cease with the joint duration of the lives; but should the value of the payment be desired, when it is to continue during  $A$ 's life only, it can easily be obtained by means of the formula  $\pi \cdot \frac{(1+AB)}{1+A}$ , where  $\pi = p+p's$ .

(For a neat and exact solution of this problem, see Mr. Hardy's letter in vol. ii. of this *Journal*, page 91.)

## FOREIGN INTELLIGENCE.

FRANCE.—*Summary of Fire Insurance Companies.*—M. Maas, manager of L'Union, of Paris, and one of the Foreign Correspondents of the Institute of Actuaries, has favoured us with the following summary of the operations of the French Proprietary Fire Insurance Companies for the year 1852:—

Name of the Company.	Sums Insured.	Premiums received in the Year.	Interest, &c.	Losses.	Expenses and Commissions.	Dividends paid.
	£.	£.	£.	£.	£.	£.
Nationale .....	190,176,934	148,626	9,532	61,801	50,502	44,000
Générale .....	182,288,180	148,409	6,891	65,980	55,101	25,680
Phénix .....	146,365,764	142,810	16,353	83,695	49,857	27,200
Union .....	91,051,674	82,034	5,367	38,336	29,909	20,000
Soleil .....	79,388,754	78,415	"	31,163	24,824	4,000
France .....	93,920,183	84,731	7,571	33,554	35,569	14,000
Urbaine .....	88,201,961	75,846	2,228	27,448	39,410	7,000
Providence .....	60,851,868	48,464	2,009	16,940	23,470	4,000
Other Companies	94,459,769	93,143	4,038	38,779	43,356	4,240
	1,026,705,087	902,478	53,989	397,696	351,998	150,120
Amount insured by Mutual Companies, £388,240,000.						

A similar table, for the year 1851, will be found in the *Assurance Magazine*, vol. iii. p. 163, together with a comparison for the year 1850. Exclusive of the Palladium, which does not appear in the present account, the sums insured have increased from £963,854,254 to £1,026,705,087. The ratio of premiums to the sums insured has scarcely differed at all in the three years, being respectively in 1850, .085, in 1851, .0877, and in 1852, .0879, per cent. The losses were, in 1850, 50·18 per cent. of the premiums received; in 1851, 42·8 per cent. on the premiums received, and .0375 per cent. of the total sum assured; and in 1852, they were 44·07 per cent. of the premiums received, or .0387 per cent. on the sums insured. The proportion of expenses has slightly increased in the last year, being, in 1850, 37·02 per cent., in 1851, 37·125 per cent., and in 1852, very close upon upon 39· per cent., of the premiums. The total dividends, however, had increased from £135,800 to £150,120 in the last year, increasing from 12·85 per cent. in 1850, on the premiums received, to 15·19 per cent. in 1851, and to 16·63 per cent. in 1852.

The mutual Fire Insurance Companies are stated to insure a total sum of £388,240,000, making the total fire insurances in France, in 1852, very nearly £1,415,000,000 sterling. (S. B.)

GERMANY.—We have been favoured with the following statement by Herr Rath G. Hopf, the able manager of the Gotha Life Assurance Company, showing the

*New Business and Position of the Life Assurance Companies of Germany in the Year 1852.*

Estab-lished.	Name of Company.	Year.	Assurances existing at the beginning of the Year.		New Assurances during the Year.		Assurances existing at the end of the Year.		Income (Premiums and Interest).		Claims paid.		Expenses of Management.			Assurance Fund.			Share Capital.	
			Persons.	Suma.	Persons.	Suma.	Persons.	Suma.	£.	£.	Per-sona.	Suma.	Absol-ute.	Per Cent. of Income.	Per £1000 of Suma at the end of the Year.	In General.	Reserve and ad-justed Premiums.	Clear Surplus.	Nominal.	Paid up.
1829	Gotha .....	1852	16,855	3,814,614	1,423	332,371	17,715	4,004,057	£.	£.	333	78,486	7,225	400	180	986,619	800,442	165,399	£.	£.
1829	Lubeck .....	1852	*2,040	438,883	*590	126,695	*2,330	498,977	24,060	24,060	59	13,797	3,389	1,409	679	64,609	..	..	72,857	7,286
1831	Leipzig .....	1852	4,479	741,200	268	36,214	4,652	747,457	34,413	34,413	114	17,671	2,187	635	293	184,569	159,161	19,308	Mutual	Mutual
1831	Hanover .....	1852-3	{ 2,919 Policies.	240,014	{ 82 Pol.	7,786	{ 2,913 Policies.	241,400	7,884	7,884	49	4,671	496	629	205	36,464	..	..	Mutual	Mutual
1834	Trieste .....	1852	*2,320	498,810	*290	62,188	*2,520	541,000	32,061	32,061	..	..	..	..	..	87,001	74,920	12,081	Mutual	Mutual
1836	Berlin .....	1852	6,985	1,163,371	554	81,357	7,225	1,198,600	59,592	59,592	173	32,529	3,476	583	290	232,126	189,072	43,054	142,857	28,571
1836	Munich .....	1852	1,423	146,653	354	38,508	1,644	172,824	*6,857	*6,857	28	2,441	..	..	..	27,621	..	..	Capital of the Loan Bank.	..
1840	Vienna .....	1852	1,850	147,038	612	26,605	2,388	167,771	7,548	7,548	*31	2,711	1,000	1,325	596	22,429	18,692	3,737	Mutual	Mutual
1842	Brunswick .....	1852	668	51,543	68	5,328	715	54,743	1,856	1,856	9	1,000	..	..	..	5,637	..	..	Mutual	Mutual
1845	Frankfort .....	1852	709	139,340	173	33,362	808	154,873	6,743	6,743	11	1,375	917	1,360	892	31,171	..	..	244,898	24,490
1846	in Hammonia .....	1852	1,128	77,643	201	19,565	*1,230	84,724	3,164	3,164	*27	1,871	1,404	4,438	1,657	2,068	..	..	..	1,230
1847	Janus .....	1852	{ 2,561 Policies.	316,108	{ 621 Pol.	71,865	{ 2,945 Policies.	357,703	12,949	12,949	42	5,421	2,360	1,823	660	..	..	..	71,429	7,143
	Total ..	..	43,937	7,776,217	5,236	841,842	46,980	8,224,129	377,628	377,628	876	161,973	..	..	..	1,680,314	..	..	732,041	88,720

\* Approximated.



In vol. iii. of the *Assurance Magazine*, p. 233, will be found a similar statement, for the same Companies, for the year 1850; and we are glad to perceive that whilst there has been a considerable increase in the new and the existing business, there is a positive, though small, diminution in the amount of claims in the year. The average amount of the sum assured to each person has been—on the new business, £161, and on the business existing at the end of the year, £175; and the average of each claim has been £185. The absolute expenses of management have increased in the total about 10 per cent. in the two years, but relatively to the total income are extremely moderate, being, in the case of nine Companies founded between 1829 and 1848, 6·7 per cent. of the total income in 1850, and nearly the same rate per cent. on the increased income in 1852. The general progress of life assurance made in Germany will be seen in the following comparison:—

	1850.		1852.		Increase per Cent.	
	Persons.	Sums.	Persons.	Sums.	Persons.	Sums.
		£.		£.		£.
Assurances existing at the beginning of the year . . . . .	38,937	7,053,131	43,937	7,775,217	12·8	10·2
New assurances during the year . . . . .	4,355	718,485	5,236	841,842	20·2	17·2
Assurances existing at the end of the year . . . . .	41,474	7,401,906	46,980	8,224,129	13·3	11·1
Income—Premiums and interest . . . . .	..	334,620	..	377,628	..	12·9
Claims paid . . . . .	823	162,351	876	161,973	6·4	Small decrease.
Assets . . . . .	..	1,418,857	..	1,680,314	..	18·4

(S. B.)

JAMAICA.—*Report of the Jamaica Mutual Life Assurance Society, Kingston, 1st September, 1853.*—The directors have to submit to the members of the Society their report on the business and general position of the Institution, for the six months ending on the 4th July, and for the further period ending on the 25th of that month, embracing the second half year's premiums and other intromissions to that date. During the period aforesaid, and up to the present date, thirteen proposals have been made, amounting to £4,950, all of which (with the exception of one for £500) have been accepted, while during the same period three deaths have taken place, involving calls amounting to £1,800.

On the subject of the reference to the Government Actuary, already so frequently alluded to, the directors would draw the attention of members to the following letter from that gentleman to the chairman's agents in London, who were requested personally to communicate with him on the subject of the unaccountable and annoying delay which had taken place in the transmission of his report.

“National Debt Office, 14th July, 1853.

“Gentlemen,—The case of the Jamaica Mutual Life Insurance Company has been for some time in preparation, and would have been earlier disposed of, although requiring great deliberation, but for the circumstance that the recent introduction into Parliament of several new measures, such as the Succession Duties Bill and the Savings Banks Life Annuities, &c., &c., has during the last few months thrown a perfectly unprecedented amount of public business on my peculiar department.

"I have lately resumed consideration of the subject, however, and hope, as soon as I can get breathing time at the close of the session, to proceed with it more rapidly, and report without much further delay.

"Messrs. Davidson & Peter." (Signed)

"A. G. FINLAISON.

The directors have further to state in reference to this matter, that such further communications have gone on from Jamaica as must ensure the receipt of the report at no distant period. The delay which has occurred has proved not only inconvenient in the highest degree, looking to the particular points on which the opinion of the actuary was requested, but as a means also of arresting the carrying out of other improvements in the general arrangements of the Society, now under the consideration of the directors, but the submitting of which to the members of the Society must be postponed until the special general meeting following on the receipt of the long-looked-for report, and which will be convened by the directors the first moment they are in a situation to do so.

The directors deem it right to notice that the secretary claims some consideration for the assistance afforded by him to the actuary, under the direction of the general meeting of November, 1851.

At present, it only remains to them to invite attention to the accounts for the portion of the year involved, and which, all circumstances considered, the peculiar situation of the country more particularly, it is hoped will be found satisfactory to all, as furnishing unquestionable evidence of the prosperity and public utility of the Association.

*Statement of Affairs, July 4th, 1853.*

<i>Dr.</i>		£.	s.	d.
To claims outstanding . . . . .		51	12	3
Receipts towards a contingent reversionary annuity . . . . .		182	8	0
		234	0	3
Surplus, 1853 . . . . .		46	4	0
Premiums on assurances, 1853—first six months . . . . .		2,793	3	10
Interest accrued on investments, ditto . . . . .		718	6	5
Gross surplus arising on the year, 1852 . . . . .		4,383	17	2
Same for the period between 1 May, 1844, and 5 Jan., 1852				
—now under the consideration of the Government Actuary		17,717	9	1
		£25,893	0	9
<i>Cr.</i>		£.	s.	d.
By Island Treasury . . . . .		24,593	0	0
Ditto, interest accrued . . . . .		645	16	8
Colonial Bank . . . . .		68	18	7
Loans upon policies . . . . .		239	13	1
Office furniture . . . . .		86	7	0
Law expenses, 6 months . . . . .		11	8	0
Directors' fees, ditto . . . . .		24	13	6
Current expenses—				
Rent . . . . .	£12	10	0	
Office servant . . . . .	4	16	0	
Secretary, 6 months . . . . .	125	0	0	
Medical fees and commission . . . . .	16	16	0	
Advertising and printing . . . . .	34	12	0	
Stationery and petty disbursements . . . . .	19	9	11	
Bank commission . . . . .	10	0	0	
		223	3	11
		£25,893	0	9

Calls on the Society over the first six months, and payable during the present year—say, £1,000, £500, and £300; equal to £1,800, to be provided over the last six months.

Contracts carried forward to the next six months, £86,450—say, 167 in number, on 147 lives, £1,800 being on policies for limited terms, and £84,650 on policies for the whole term of life; to which is further to be added a contract for a contingent reversionary annuity of £200.

*Dr. Statement of Affairs, July 25th, 1853.*

To claims outstanding, beyond £1,800 as before mentioned,	£.	s.	d.
falling due during the year . . . . .		13	10 3
To receipts towards a contingent reversionary annuity . . . . .		212	8 0
		225	18 3
Surplus, 1853 . . . . .		46	4 0
Premiums on assurances, 1853, to date . . . . .		4,914	5 3
Interest accrued to date . . . . .		818	14 10
Gross surplus arising on the year 1852 . . . . .		4,383	17 2
Gross surplus prior thereto . . . . .		17,717	9 1

£28,106 8 7

*Cr.*

Island Treasury as of this day, bearing interest at 6 per cent. per annum . . . . .	£.	s.	d.
Orders, &c. on same, for stipends and public dues, bearing 6 per cent. interest . . . . .		435	0 2
Colonial Bank at call . . . . .		1,320	7 5
Loans upon policies, bearing 6 per cent. interest . . . . .		439	13 1
Overdue premiums . . . . .		8	10 0
Office furniture . . . . .		86	7 0

£27,789 17 8

Law expenses . . . . .		11	8 0
Directors' fees . . . . .		28	7 0
Current expenses to date . . . . .		276	15 11

£28,106 8 7

Contracts as above stated.

## CORRESPONDENCE.

### ON THE INADEQUACY OF EXISTING DATA FOR DETERMINING THE RATE OF MORTALITY AMONG SELECT LIVES.

*To the Editor of the Assurance Magazine.*

SIR,—Will you be so good as to insert the few following observations in reference to Mr. Farren's letter in last Number, commenting on the paper which appeared there upon the inadequacy of existing data for determining the rate of mortality among select lives?

First, in regard to the deduction made by me in Section VII.—that the Gotha experience exhibited a rate of mortality of about  $\frac{1}{2}$  per cent. during the first year—let me say, that it seems to me a necessary consequence of the statements to which I have referred; but I have been informed by a gentleman conversant with the original tables, that the result inferred is not legitimately deducible. I am not acquainted with the tables myself, but, in

the circumstances stated, I would rather at present withdraw altogether the qualified statement I have made on this point.

I do not propose to revert here *directly* to the special question of the agreement or difference of the rate of mortality for one year among select lives of 21 to 25, and 41 to 45, to which Mr. Farren has principally directed his attention. The object of my paper was to show that the data on which Mr. Farren had founded his general table of the rate of mortality among select lives for the first year were not data worthy of credit for that purpose. The general result of his data showed a rate of mortality of about 1 per cent. among the whole lives during the first year; the result of my observations is, that a half of this is a much nearer approach to the truth. Now most parties reading Mr. Farren's letter will be led to infer that the experience on which I have founded is isolated and fractional, as compared with the apparently large body of data which it might be surmised, from his letter, support his deductions. The facts, however, are directly the reverse.

The amount of insurances on which I have founded is £50,000,000; and assuming that the average amount of sums assured is £800, the number of persons would be 62,500; and, as they support my conclusion and contradict his, I am surely as much entitled as he to take credit for the numbers of the Equitable, 21,398; together, 83,898. Now, the whole number of his policies is 62,014; but these include the 21,398 Equitable lives, which, as I have said, support me and contradict him; and they also include 9,236 Irish lives, which it seems quite out of the question to found on as data for deriving the value of select life; indeed, one of the principal advantages of the Experience tables was to show the badness of the Irish lives, and to inculcate the necessity of more care in their selection.

I hope that the above statement may satisfy your readers that, whatever may be the true rate of mortality among the general mass of select lives during the first year, the experience on which I have founded is of a much more extensive character than that relied on by Mr. Farren.

I see I have been misunderstood as having stated 0.55 as the mortality per cent. during the first year among lives from 21 to 45. This is the average rate of mortality exhibited on lives *at all ages*; and from this, in the last section of the paper referred to, it appears to me to be fairly argued that the average rate of mortality among lives at 45 and under cannot exceed 0.4 per cent. during the first year.

I will only add, that I am gratified by the attention which Mr. Farren has kindly bestowed on the paper, though I confess I am disappointed that it has made no alteration in his views. We agree in one point—that the principal question at present is not as to the correctness of the deductions which he has made from the data, which deductions I readily admit to be correct, but as to the value of the data themselves. That the data are valuable for many purposes I also admit; but that they are of any value as indicating the real rate of mortality among select lives during the first year of selection, the investigations I have made most completely disprove: nor do I suppose that the actuaries who collected and arranged them can consider them as affording legitimate data for the solution of this important question.

I am, Sir,

Your most obedient Servant,

WILLIAM SPENS.

Glasgow, 23rd November, 1853.

## ON THE SAME SUBJECT.

*To the Editor of the Assurance Magazine.*

SIR,—In pursuance of that system of interim-communication which has always existed between Mr. Spens and myself during our printed correspondence in your pages, he now further refers me to some remarks of his, for insertion in your January number. I have only to state, in reply, that I conceive your readers, like myself, will be still sceptical as to the admissibility of Mr. Spens' two propositions, which I infer to be—firstly, that although a healthy man at 45 is readily to be distinguished from a healthy man at 25, still that time, in changing everything else, leaves the year's chance of mortality untouched; and, secondly, that about 8s. is the true premium for an insurance of £100 on a healthy man for one year, at any age from 25 to 45. If such be the conclusions to which Mr. Spens' own collected data, upon examination, lead him, I conceive I may fairly once again refer him to a former paper of mine, "*On the reliability of data, when tested by the conclusions to which they lead,*" and leave the question in the hands of your readers to determine what trust, for practical purposes, is to be placed in data from which such paradoxes spring, and how far such data are to be allowed to override other data which do not weaken but confirm our general impressions.

Your obedient Servant,

EDWIN JAMES FARREN.

## GOVERNMENT INTERFERENCE WITH ASSURANCE COMPANIES IN GERMANY.

*To the Editor of the Assurance Magazine.*

(The following extract from a letter from HERR RATH. G. HOPF, of Gotha, may be interesting at the present time.)

SIR,—In Germany the number of new Life Insurance Offices is considerably increasing, though many projects are hindered by the Governments. With the exception of the Hanseatic Towns, where insurance affairs are quite free and under no constraint at all, the rule is to be found in all countries of Germany, that an Insurance Company cannot be established without the permission of Government. Before granting this permission or license, the Government examines the statutes and tables of premiums, and demands alteration if it finds any one thing or another not according with its principles. Indeed, many an unsubstantial project is stifled in the first germ by this measure; but many a good enterprise is also put under a constraint which prevents its free movement and useful development. One great disadvantage is, that the different Governments of Germany act upon different principles; and that a new Insurance Company, when it has satisfied the prescriptions in its own country, must then also satisfy the claims of the other 34 States of Germany, which are frequently very different, before it can effect assurances and appoint agents in them. Some Governments are very strict in admitting foreign Assurance Companies; and the Austrian Government allows, a few cases excepted, no Company from an-

other country to appoint agents in its States. This want of competition was the reason why assurance was for a long time in Austria at a very low ebb; only lately it has begun to extend from Trieste, where some well organized Insurance Offices exist. Up till recently it was principally fire insurance, on which the different Governments practised a very restraining oppression; but lately they have begun also to extend it to life insurances. Thus, for example, the Hanoverian Government has lately demanded from all Companies which do business in that country by means of agents, that they should give in, besides the tables of premiums, also the mortality table according to which the premiums are computed—that they should also specify the net premiums, the marginal additions to the net premiums, and the reserve value of the policies for the different ages. The Government of Wirtemberg demands likewise the production of the mortality table, and stipulates moreover that each foreign Life Assurance Office should appoint a chief agent as plenipotentiary-general for the whole kingdom—that it should deposit every year with the Government statements of the new insurances effected in Wirtemberg, and of the amount of all the assurances there—that it submit, also, in questions of dispute, to the decision of the tribunals of Wirtemberg, and according to circumstances give bail to the Government for the punctual execution of its obligations. Thus the claims of different Governments are often very different; and many an establishment which has submitted to the claims of one Government can therefore easily be excluded from another country, because prescriptions are made in it which do not agree with those claims. In the great subdivision of Germany these are difficulties which throw great obstacles in the way of a beneficial development of assurance business. Every established Company, after having existed some time, would hesitate to make essential alterations in its statutes, because it would be obliged to obtain the consent of all those Governments to it in the countries in which it effects business, which is frequently subjected to great difficulties. As for fire insurance, the forms even of the proposals of insurance and of the policies are subject to the control of Government, and different Governments have laid down different rules for them; so that one and the same Company must use different formulæ at the same time, according as it effects insurances in this or that country. If your country shows the injury and defects which arise from the want of control as regards assurance, you will find soon in Germany the inconveniences which result from applying too many and too different regulations.

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## REVIEWS OF NEW WORKS.

*On a Theory of the Conjugate Relations of two rational Integral Functions, comprising an application to the Theory of Sturm's Functions, and that of the greatest Algebraical Common Measure.* By J. J. SYLVESTER, Esq., M.A., F.R.S., Barrister-at-Law.

THIS treatise or memoir has nothing in connection with the subjects usually discussed in the *Assurance Magazine*. We are induced nevertheless to give the following analysis of its contents, extracted from the "Proceedings of the Royal Society," partly on account of its very original

and remarkable character, and partly on the score of our knowledge that several of our readers are much interested in the progress of Mr. Sylvester's most curious and erudite investigations.

"The memoir consists of four sections. In the first section, the theory of the residues obtained by applying the process of the common measure to two algebraical functions is discussed. It is shown that a certain superfluous or *allotrious* factor enters into each, the value of which, in terms of the leading coefficients of the residues in their simplified form, is determined; and the simplified residues themselves are subsequently obtained from the given functions by a direct method.

"In the case where the two functions are of the same degree ( $m$ ) in  $x$ ,  $m$  functions of the degree  $m-1$  in  $x$  are formed, which, being identical with those employed in the process which goes by the name of Bezout's abridged method, the author terms the Bezoutics or Bezoutic primaries. By linear elimination performed between these, a second system of functions, whose degrees in  $x$  extend from  $m-1$  to 0, are formed, which he terms the Bezoutic secondaries; these Bezoutic secondaries are proved to be identical with the simplified residues. A similar theory is shown to be applicable in the general case of the functions being of unlike degrees. Other modes of obtaining the simplified residues by a direct method are also given. The coefficients of the primary system of Bezoutics form a square symmetrical about one axis, to which (as to every symmetrical matrix) a certain homogeneous quadratic function of ( $m$ ) variables is appurtenant. This quadratic function is termed the Bezoutiant, the properties of which are discussed in the fourth section.

"Every residue is what may be termed a syzygetic function or conjunctive of the two given functions; these being respectively multiplied by certain appropriate rational integral functions, their sum may be made to represent a residue. These multipliers are termed the syzygetic multipliers; and they form two series, one corresponding to the successive numerators, the other to the successive denominators of the convergents to the algebraical continued fraction which expresses the ratio of the two given functions. The residues are obviously a particular class of the conjunctives that can be formed from the given functions; every conjunctive has the property of vanishing when the two functions to which it is appurtenant vanish simultaneously; and in general, for any given degree in  $x$ , an infinite number of such conjunctives can be formed.

"In the second section, the author commences with obtaining in terms of the roots and factors of the two given functions a variety of forms, all containing *arbitrary* forms of function in their several terms, and representing a conjunctive of any degree not exceeding the sum of the degrees of the two given functions in its most general form. The author then reverts to the Bezoutic system of the first section, and obtains the general solution for the conjunctive of any given degree in  $x$  in terms of the *coefficients* of the given function; by aid of this general solution he demonstrates that the residues obtained by the common measure process (divested of their *allotrious* factors) are the conjunctives of the lowest *weight* in the roots of the given functions for their several degrees; and obtains the value of this weight. He then demonstrates that certain rational but fractional forms ascribed to the arbitrary functions in the general expressions for a conjunctive in terms of the roots, will make these expressions integral and of the minimum weight; they will all be consequently identical (save as to a

numerical factor) with one another, and with the simplified residues. The formulæ thus obtained for the simplified residues deserve particular attention on their own account, being double sums of terms, any single series of which is made up of fractions whose denominators are the products of the differences between a certain number of the roots of each one of the functions and a certain other number of the same combined in every possible manner, thus containing a vast extension of the ordinary theory of partial fractions. The author subsequently determines, under a similar form, the value of each of the multipliers which connects the given functions syzygetically with the simplified residues, and establishes a general theorem of reciprocity, by aid of certain general properties of continued fractions, between the series of residues and either series of syzygetic multipliers.

"The third section is divided into two parts. The first part is devoted to a determination of the values of the preceding formulæ in the case to which Sturm's theorem refers, where one of the given functions is the first differential derivative of the other; when this is the case the roots and factors of the second function are functions of those of the first, and it will be found that one of the polymorphic representations for the residue of any given degree will consist of terms, each of which is convertible into an integral function of the roots and factors of the given primitive function: in this way are obtained the author's well known formulæ for Sturm's auxiliary functions. In like manner, the multiplier which affects the derivative function in the syzygy between the primitive, the derivative and any simplified residue, may also be expressed immediately as a sum of integral functions of the roots and factors of the primitive, complementary in some sort to the formulæ for the residues. The formula for the remaining syzygetic multiplier (that which attaches to the primitive itself) cannot be obtained directly by a similar method, but it is deduced by aid of the syzygetic equation itself, all the other of the five terms of which are known, or have been previously determined. The process of obtaining this last-named multiplier is one of great peculiarity and interest, and results in a form far more complex than that for the residues or for the other syzygetic multiplier.

"In the second part of the third section are contained some curious and valuable expressions for the residues and multipliers, communicated to the author by M. Hermite; and an instantaneous demonstration is given of the properties of the author's formulæ for Sturm's auxiliary functions in determining the real roots of an equation by a method quite irrespective of the theory of the common measure, and depending upon a certain extremely simple but unobserved law of quadratic forms, which he terms the law of *inertia*. In place of these formulæ it is shown that others greatly more general, and possessing the same properties as regards the determination of the real roots, may be substituted; the known formulæ are, however, the most simple that can be employed. The author then proceeds to inquire as to the nature of the indications afforded by the signs of a series of successive simplified residues, taken between any two functions independent of one another, instead of standing in the relation of primitive and derivative, as in Sturm's theorem; this leads to the theory of interpositions, of which it is shown that the Sturmian theorem may be treated (not so much as a particular case) as an easy corollary. In this part the author obtains an entirely new rule for determining, in an infinite variety of ways, a superior and inferior limit to the real roots of any algebraical equation, whether numerical or literal.



"The fourth section is also divided into two parts. In the first part, the index of interposition for two functions of the same degree is shown to be determinable by means of the quadratic form, previously termed the Bezoutiant; and as a corollary, it follows that the number of real roots of an equation of the degree  $m$  depends in a direct manner on the number of positive roots in another equation of the degree  $m-1$ , all of whose roots are real, and the coefficients of which are quadratic combinations of the coefficients of the given equation.

"In the second part of this section, the Bezoutiant is considered under a purely morphological point of view. It is shown to be a combinative invariant of the two given functions (each treated as homogeneous functions of two variables), remaining unaltered when any linear combination of the two given functions is substituted for the functions themselves, and also when any linear substitutions are impressed upon the variables of the given functions, provided that certain corresponding substitutions are impressed upon the variables of the Bezoutiant. The family of forms to which the Bezoutiant belongs is ascertained, and a method given for finding the constituent forms of this family (one less in number than the number of odd integers not exceeding in magnitude the degree of either of the given functions which, throughout this section, are supposed to be of equal dimensions in  $x$ ), of which all other forms of the family will be numerico-linear functions. The numerical coefficients connecting the Bezoutiant with this constituent group are calculated for the cases corresponding to any index from 1 to 6 inclusive. Finally, the author remarks upon the different directions in which the subject matter of the ideas involved in Sturm's justly celebrated theorem admits of being expanded, and of which the most promising is, in his opinion, that which leads through the theory of interpositions. Several of the theorems in this memoir have been previously published by the author, but they are here given along with a great deal of new matter in a connected form, and with the demonstrations annexed, for the first time."

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*A Treatise upon the Law of Life Assurance upon the constitution of Assurance Companies, the construction of their Deeds of Settlement, the Sale of Reversionary Interests, and Equitable Liens arising in connection with Life Policies: with an Appendix of Precedents for the Assignment of Policies by way of sale, mortgage, and settlement; Notes of Cases; Statutes; and an Index of Private Acts obtained by Insurance Companies.* By CHARLES JOHN BUNYON, M.A., of the Inner Temple, Esq., Barrister-at-Law. London: Wildy & Sons, Lincoln's Inn Archway. Dublin: Hodges & Smith, Grafton Street. 1854.

CONSIDERING the extent to which the practice of life assurance has been carried in this country, it is surprising how little has been written upon the law of it; and the more so when the great number of cases before the courts, on all sorts of points connected with the practice, is taken into account. There can be no doubt that the want of a treatise which should throw some light upon the infinite variety of questions constantly presenting themselves to the harassed minds of the actuaries and managers of Life Assurance Companies has been extensively felt, and we are much mistaken if these gentlemen will not look upon Mr. Bunyon's work as a most acceptable

addition to their stores of information. They are not, it is true, either lawyers themselves or expected to possess the learning of that profession; nevertheless, it is of the greatest importance for them to be acquainted with the general principles connected with the law of their subject, from the very circumstance that it is one which the legal profession are evidently at a loss at times to comprehend, and about which the Courts even not unfrequently exhibit grave misapprehensions.

At a future day we hope to have an opportunity of illustrating this; at present our business is to endeavour to make our readers acquainted with the character of Mr. Bunyon's book, which perhaps we can best do by giving briefly the heads of some of the chapters in it.

The author commences Part I. with "The nature of the contract at common law, and as modified by the statute law"; "How far it fulfils the legal conditions of a wager, or necessarily operates as an indemnity." He then discusses the "Proposal"; "Effect of warranties"; "Medical and private referees"; "The policy"; "Indisputable and unchallengeable policies"; "Insurances against accident"—"against the birth of issue"; "Fidelity Policies"; "Insurance Offices"; "Charters of incorporation"; "Deeds of settlement"; "Friendly Societies"; "Powers and duties of directors, officers, and agents." Part II. treats of the "Assignments of policies"; of "Considerations"; of the "Bankruptcy of the assured"; of "Advances by way of mortgage of the policies"; of the sale of "Reversionary Interests," &c.; and of "Voluntary assignments." In Part III. we have "The rights and interests of persons under disabilities"; "The claim, and its payment"; "The proof of death"; "Enforcement of claims by action at law, or suits in equity"; "Annuities"; "Stamps"; "Prospect of future legislation"; and "Recommendations for the amendment of the law"; &c. &c. To these is added an appendix, containing "Precedents," or forms of the legal instruments arising under assurance contracts of various kinds, with a long list of the cases cited, and a good index.

We cannot presume to decide upon the merits of this work in a legal point of view; but it certainly appears to us to touch upon a very great number of questions of the deepest importance in the conduct of life insurance business, and to treat them with great clearness and ability. It is a book which every manager of a Life Assurance Company will do well to make himself thoroughly acquainted with; we are satisfied that he will not regret the labour bestowed in doing so.

The style of the author may be judged of from the following passage, in reference to the sale of reversionary interests:—

"It seems to have been assumed that the opinions of actuaries are mere quotations from the tables, and that they apply one Procrustean rule to all questions; while in fact it is notorious, at least among actuaries, that the tables will prove any result, according to the rate of mortality and interest selected. On examining the cases, it may be thought that justice has scarcely been done to their opinions; but if so, it is submitted that the blame to a very great extent rests with the actuaries themselves. Their custom has been, in replying to questions proposed to them, to give a value, but to withhold their reasons for fixing it. In this respect they have followed the practice of auctioneers and valuers, who have been guided by their own practice in valuing other descriptions of property. The question in each case is thus reduced to a mere matter of opinion or guess, which is sufficiently justifiable when the subject valued is a chattel of a kind ordinarily

sold by the valuer, but in the present case is not satisfactory. The opinion of an eminent actuary or valuer may satisfy the mind of the vendor at the time, but cannot alone satisfy the Court; and indeed the remark of a learned judge as to the opinions of counsel seems here especially applicable—namely, that opinions are only eminent when they give eminent reasons.”

It may be observed that these remarks very much bear out what is said on the same subject in a former paper in this *Journal* (see vol. ii. pp. 160 & 163).

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*The Results of the Census of Great Britain in 1851; with a description of the Machinery and Processes employed to obtain the Returns: also an Appendix of Tables of Reference.* By EDWARD CHESHIRE, Assistant Secretary to the Institute of Actuaries, Assistant Secretary to the Statistical Society, and one of the Secretaries of the Statistical Section of the British Association for the Advancement of Science. London: John William Parker & Son, West Strand.

THE Census Returns extended, in manuscript, over some *forty thousand* volumes, and occupied the Census Department upwards of two years to reduce them to the form in which the first portion of the census was published—viz., to the limits of three bulky folios. This pamphlet is a digest of the varied and interesting contents of the folios, and was read before the Statistical Section of the British Association on the 8th of September, 1853.

Considering the vast mass of original matter which Mr. Cheshire had to deal with, he has exhibited great skill in extracting the more pithy parts of the subject, and in frequently drawing from it generalizations which cannot fail to interest even readers indifferent to such disquisitions. Notwithstanding the comparative brevity of his pamphlet, however, there are many who would be deterred from a perusal of it by the nature of the subject; and we shall therefore endeavour once more to condense it, selecting such portions as appear to us to contain the more curious and useful information in regard to the matter. The author says—

“The inquiries undertaken at the census of 1851 were of a far more extensive character than those pursued at any previous enumeration; for it was resolved to exhibit not only the statistics of parishes, and of parliamentary and municipal boroughs, but also of such other large towns in England and Scotland as appeared sufficiently important for separate mention, and the statistics of all the ecclesiastical districts and new ecclesiastical parishes which, during the last forty years, had been created in England and Wales. In addition, also, to the inquiry concerning the occupation, age, and birthplace of the population, it was determined to ascertain various relationships, such as husband, wife, son, daughter—the civil condition; as, married, unmarried, widower, or widow—and the number of blind, or deaf and dumb.

“The local machinery by which the objects thus contemplated were to be attained, differed considerably in England and Scotland. In England and Wales the *registration districts*, which for the most part are coterminous with the *unions*, were made available for enumerating the population; but in Scotland, which is, unfortunately, without any system of registration, the census was taken through the agency of the sheriffs of counties, and the provosts, or other chief magistrates of royal and parliamentary burghs. The total number of enumeration districts thus apportioned in Great Britain and its islands was 38,740; to each of these a duly qualified enumerator was appointed.

“It was necessary that these enumeration districts should be formed with a careful reference to the various divisions of the country, the population of which was to be separately distinguished in the returns. Accordingly, the instructions issued to registrars in England, for the formation of these districts, directed that while the boundaries of parishes should be taken as the *basis* upon which to frame the various divisions, attention should also be paid to other boundaries. In this manner the *whole surface* of Great

Britain and of the small adjacent islands was divided into suitable districts, and an equal number of enumerators appointed.

"The first step taken by the enumerators was to deliver to every occupier of a house or tenement a *householder's schedule*. Upon this schedule inquiry was made as to the name, relation to head of family, condition, sex, age, occupation, and birthplace, of every person in Great Britain; and also as to how many of them were blind, or deaf and dumb. For the use of the poorer native population of Wales, a certain number of the forms were printed in the language of that country. The total number of schedules forwarded from the Census Office was 7,000,000, weighing some 40 tons. The schedule was to be filled up on the night named. No one present on that night was to be omitted, and no person absent was to be included, except *miners, potters*, and other workpeople usually engaged at their labour during the night, and regularly returning home in the morning; or *policemen* and others on night duty. Persons *travelling* were enumerated at the hotels or houses at which they arrived on the following morning.

"The enumerators were allowed one week for the transcription of the contents of the householders' schedules into the enumeration book, and for the completion of the various summaries and estimates. The schedules and book were then forwarded to the respective registrars, and the duties of the 38,740 enumerators terminated. The census returns were now in the hands of 3,220 registrars, or dividers of districts.

"The registrars immediately commenced a careful and systematic examination and revision of the documents described, directing their attention, according to instructions, to nine specially defined points in respect to them. With the completion of these duties, for which a fortnight was allowed, the functions of the 3,220 registrars, or dividers of districts, ceased. The summaries and enumeration books, as far as England and Wales were concerned, were now in the hands of 624 superintendent registrars.

"The chief duties of the superintendent registrars were to expedite the investigation; but they had also further to revise the summaries and enumeration books, and to transmit them to the Census Office, there to undergo a still further revision before the commencement of the abstracts.

"A complete enumeration was thus effected of all persons resident upon the *land* of Great Britain, and on canals and small streams; but an important portion of the population remained yet to be reached—viz., persons on board vessels in harbours and navigable rivers, and those at sea in ships belonging either to the royal navy or to the merchant service."

Mr. Cheshire explains the processes employed to enumerate these, and also the means by which the numbers of British subjects in foreign States were obtained; and continues—

"In two months from the taking of the census, the householders' schedules, amounting to about 4,300,000 distinct returns, and the enumeration books, nearly 39,000 in number, were received at the Census Office; and the result of the enumeration being obtainable from the *summaries* forwarded with the books, a *rough* statement of the total population and number of houses was transmitted on the 7th of June, ten weeks from the night of the census, to the Secretary of State, and at once made public.

"With the view to secure accuracy in the census, it was considered an indispensable process to examine every total and summary throughout the enumerators' returns; accordingly a minute revision of the whole was undertaken, involving the examination and totaling of more than 20 millions of entries, contained on upwards of 1,250,000 pages of the enumerators' books.

"The portion of the census recently published, and now under consideration, gives the numbers of the people in Great Britain, distinguishing males and females, and the number of houses occupied, unoccupied, and building; and, in a condensed form, all previous census abstracts. In a future publication the ages of the population will be given, their birthplace, condition as regards marriage, and occupations; the numbers of blind, and the numbers of deaf and dumb. An analysis of the returns of churches, schools, institutions, and the like, will also appear.

"For the convenience of statistical investigation, the Registrar-General divided England into ten great topographical divisions; Wales, including Monmouthshire, was constituted a division by itself; Scotland was divided into two divisions; and the islands in the British Seas formed a small division by themselves.

"The number of persons absent from Great Britain and Ireland on the night of the census was about a quarter of a million—viz., army, navy, marine, and merchant service, belonging to Great Britain, 162,490; belonging to Ireland, 49,704; and British subjects resident or travelling in foreign countries, 33,775. The latter were distributed as follows:—France, 20,357; Belgium, 3,828; Russia, 2,783; Two Sicilies, 1,414; Turkey, 1,235;

Sardinian States, 1,069; Greece, 1,068; Mexico, 755; China, 649; Saxony, 321; Alexandria, 155; Cairo, 85; Persia, 33; Tripoli, 23.

"The population of a country is subject to considerable displacements, and it is impossible to take the census at any period of the year when some disturbing causes are not in operation. It was considered on the whole that no better day in 1851<sup>1</sup> could be fixed on than the last day of March, which was also the month in which the *first* census of Great Britain was taken.

"The Great Exhibition, in 1851, which attracted persons to London from all countries, produced a greater and more general movement of the population than had ever before been witnessed in the times of which there are authentic records.\* The number of *visits* to the Crystal Palace, which was opened on the 1st of May and closed on the 15th of October, was 6,039,195, and it has been estimated that the number of *persons* who visited it was 2,000,000. It was not, however, considered that an unusual number of foreigners were in England in *March*, when the census was taken; for a return made to the Home Office, under the Alien Act, shows the landing of only 65,233 aliens in the year.

"The number of people in Great Britain and the small adjacent islands, in 1851, was 20,959,477; and the men in the army, navy, and merchant service, and East India Company's service, abroad, on the passage out, or round the coasts, belonging to Great Britain, amounted, on the same day, to 162,490. The annexed table exhibits the distribution of the people:—

"TABLE I.—Population of Great Britain in 1851.

	Males.	Females.	Total.
England .....	8,281,734	8,640,154	16,921,888
Scotland .....	1,375,479	1,513,263	2,888,742
Wales .....	499,491	506,280	1,005,721
Islands in the British Seas .....	66,854	76,272	143,126
Army, Navy, and Merchant Seamen .....	162,490	....	162,490
Total .....	10,386,048	10,735,919	21,121,967

"British subjects in foreign States are not included in the general population, as given in the preceding table, the exiles and foreign subjects in Great Britain being considered a set-off against them."

The Census Report illustrated this 21,000,000 of people by an allusion to the Great Exhibition. On one or two occasions 100,000 persons visited the Crystal Palace in a single day; consequently, 210 days of such a living stream would represent the number of the British population. Another way of realizing the notion of 21 millions of people is by considering their numbers in relation to space: allowing a square yard to each person, they would cover *seven square miles*. Mr. Cheshire supplied a further illustration:—

"If all the people of Great Britain had to pass through London in procession, four abreast, and every facility was afforded for their free and uninterrupted passage during 12 hours daily, Sundays excepted, it would take nearly three *months* for the whole population of Great Britain to file through, at *quick march*, *four deep*. To count them singly, at the rate of one a second, would take a year and a half, assuming that the same number of hours daily were occupied, and that Sundays also were excepted.

"The excess of females in Great Britain was 512,361, or as many as would have filled the Crystal Palace five times over. The proportion between the sexes in 1851 was 100 males to 105 females, or about the same as in 1801.

"The *births* during the last thirteen years give a reversed proportion, viz., 105 *boys* to 100 girls. The disparity in the proportions of the sexes is greatest in Scotland, there being no less than 110 females to 100 males in that country.

"The following table gives the population of Great Britain and the islands of the British Seas, including the army, navy, and merchant seamen, abroad, as enumerated at each census from 1801 to 1851, inclusive:—

\* It is stated incidentally, in the census, that in 1845 a million and a half of people on the Continent visited, in pilgrimage, the *Holy Coat at Trèves*.

"TABLE II.—Population of Great Britain, at each Census, from 1801 to 1851, inclusive.

Years.	Males.	Females.	Total.
1801	5,368,703	5,548,730	10,917,433
1811	6,111,361	6,312,859	12,424,120
1821	7,096,053	7,306,590	14,402,643
1831	8,133,446	8,430,692	16,564,138
1841	9,232,418	9,581,368	18,813,786
1851	10,386,048	10,735,919	21,121,967

"The population of Great Britain has nearly doubled since the commencement of the present century, notwithstanding the great number that have emigrated. The increase in the last fifty years has been 93·47 per cent., or at the rate of 1·329 per cent. annually, the increase of each sex being about equal.

"The annual *rate* of increase has varied in each decennial period; thus, in 1841-51, the population has increased, but the *rate* of increase has *declined*, chiefly from accelerated emigration.

"The emigration from Great Britain and *Ireland* in the ten years 1821-31 was 274,317; in the ten years 1831-41 it amounted to 717,913; and in the ten years 1841-51 it had increased to 1,693,516.

"It has been shown by Dr. Farr, in his English Life Table, that the half of a generation of men of all ages passes away in *thirty* years, and that three in every four of their number die in half a century. Taking emigration and other movements of the population into account, it is probable that of the 21,121,967 persons in Great Britain in 1851, 2,542,289 were born prior to the census of 1801, and were enumerated on that occasion. At the present rate of mortality, a few of the present generation will be alive a century hence.

"If the population of Great Britain continue to increase uniformly at the same rate that it has done from 1801 to 1851, it will double itself every 52½ years.

"In the Act for taking the census of 1851, the term 'occupier' was substituted for the word 'family,' as being less open to misconstruction. 'Occupiers,' therefore, represent the 'families' of previous censuses. By this substitution, bachelors and spinsters were not likely to escape enumeration as *families*, which was probably not unfrequently the case in former censuses."

Some remarks by Dr. Carus, on English dwellings, are cited:—"The English (says the Doctor) divide their edifices *perpendicularly* into houses, whilst we Germans divide them *horizontally* into floors. In England, every man is master of his hall, stairs, and chambers, whilst we are obliged to use the first two in common with others."

"The possession of an entire house is strongly desired by every Englishman. But on the Continent the crowding of the middle and higher classes, who sleep in flats, is carried to a great excess, particularly in the capitals. The Department of the Seine, for instance, in 1835, had on an average twenty-two persons to a house; whilst in densely populated London, in 1851, there were barely eight persons to a house."

The definition of a "house," adopted for the purposes of the census, was—"isolated dwellings, or dwellings separated by party walls."

"The subjoined table gives the number of houses in England, Scotland, Wales, and the islands in the British Seas, respectively, in 1851:—

"TABLE III.—Houses in Great Britain in 1851.

	HOUSES.			
	Inhabited.	Uninhabited.	Building.	Total.
England .....	3,076,620	144,499	25,192	3,246,311
Scotland .....	370,308	12,146	2,420	384,874
Wales .....	201,419	8,995	1,379	211,793
Islands .....	21,845	1,095	203	23,143
Total .....	3,670,192	166,735	29,194	3,866,121

"About 4 per cent. of the houses in Great Britain were unoccupied in 1851; and to every 131 houses, inhabited or uninhabited, there was one in course of erection in that year.

"The following table gives the number of inhabited houses and the number of families in Great Britain at each census, from 1801 to 1851, inclusive; also the number of persons to a house, and the number of persons to a family:—

"TABLE IV.—*Inhabited Houses and Families in Great Britain at each Census, from 1801 to 1851, inclusive.\**"

Years.	Inhabited Houses.	Families.	Persons to a House.	Persons to a Family.
1801	1,870,476	2,260,802	5·614	4·645
1811	2,101,597	2,544,215	5·696	4·706
1821	2,429,630	2,941,383	5·800	4·791
1831	2,850,937	3,414,175	5·704	4·763
1841	3,446,797	(no returns)	5·377	(no returns)
1851	3,648,347	4,312,388	5·706	4·825

"The number of inhabited houses in Great Britain has nearly doubled in the last half century, and upwards of two millions of new families have been founded."

In England and Wales the number of persons to a house was 5·5; in Scotland, 7·8, or about the same as in London; in Edinburgh and Glasgow the numbers were respectively 20·6 and 27·5.

"The number of families to a house varied considerably in different counties, and it is difficult to account for all the anomalies which are presented."

Some 68,000 families (a 64th part of the whole), taken at hazard, were analyzed into their constituent parts, and they gave some curious results. About 5 per cent. only of the families in Great Britain consisted of husband, wife, children, and servants, generally considered the requisites of domestic felicity; and as regards the number of children *at home* in families, it appeared that nearly 900 families had each *ten* children living under the parental roof.

"The annexed table gives the number and class of public institutions in Great Britain, in 1851, and the number of persons inhabiting them:—

"TABLE V.—*Public Institutions in Great Britain in 1851.*"

Class of Institution.	Number.	Persons inhabiting them.		
		Males.	Females.	Total.
Barracks .....	174	44,833	9,100	53,933
Workhouses .....	746	65,786	65,796	131,582
Prisons .....	257	24,593	6,366	30,959
Lunatic Asylums .....	149	9,753	11,251	21,004
Hospitals .....	118	5,893	5,754	11,647
Asylums, &c. ....	573	27,183	19,548	46,731
Total .....	2,017	178,041	117,815	295,856

"Of these 295,856 persons, 260,340 were inmates, and 35,516 officers and servants.

"The excess of males over females in these institutions, about 60,000, is chiefly exhibited in the barracks and in the prisons; in the latter, from the fact that crime is four times as prevalent among men as among women.† The equality of the sexes in work-houses is remarkable. In the lunatic asylums there is a preponderance of females.

\* This table does not include the islands in the British Seas.

† Vide Mr. Redgrave's valuable Criminal Tables.

"The population sleeping in barns, in tents, and in the open air, is comprised chiefly of gipsies, beggars, criminals, and the like, together with some honest but unfortunate people out of employment, or only temporarily employed. The number of these houseless classes in 1851 was 18,249; in 1841 they amounted to 22,303. It is mentioned as a curious trait of gipsy feeling, that a whole tribe struck their tents, and passed into another parish, in order to escape enumeration.

"The subjoined table gives the number of persons enumerated in barns, tents, and barges, and in vessels in ports, either engaged in inland navigation or sea-going vessels, on the night of the census of 1851:—

"TABLE VI.—*Persons in Barns, Tents, Barges, and Vessels, in Great Britain, on the Night of the Census, in 1851.*

	Males.	Females.	Total.
Barges .....	10,395	2,529	12,924
Barns .....	7,251	2,721	9,972
Open Air, in Tents .....	4,614	3,663	8,277
Vessels .....	48,895	2,853	51,748
Total .....	71,155	11,766	82,921

"In 1851, Great Britain contained 815 towns, of various magnitudes, either market towns, county towns, or cities; 580 were in England and Wales, 225 in Scotland, and 10 in the Channel Islands. The population of these 815 towns was 10,556,288; the population in the rest of Great Britain was 10,403,189; consequently, if detached houses, villages, and small towns without markets, are called *country*, the *town* and *country* populations of Great Britain may be considered equal. The density in the country was 120 persons to the square mile; in the towns, 3,337, or about 28 times as many.

"The average population of each town in England and Wales was 15,501; of each town in Scotland, only 6,654, or less than a half that of the English town."

The adventitious character of certain towns is alluded to; many have risen rapidly from villages to cities, and have almost acquired a metropolitan character.

"Great Britain contained in 1851 *seventy* towns of 20,000 inhabitants and upwards, amounting in the aggregate to 34 per cent. of the total population of the country; whereas, in 1801, the population of such towns amounted to 23 per cent. only of the enumerated population, thus showing, in a marked degree, the increasing tendency of the people to concentrate themselves in masses. London extends over an area of 78,029 acres, or 122 square miles; and the number of its inhabitants, rapidly increasing, was two millions three hundred and sixty-two thousands two hundred and thirty-six (2,362,236) on the day of the last census."

Mr. Cheshire illustrated this number by a curious calculation:—

"A conception of this vast mass of people may be formed by the fact that, if the metropolis was surrounded by a wall, having a north gate, a south gate, an east gate, and a west gate, and each of the four gates was of sufficient width to allow a column of persons to pass out freely *four* abreast, and a peremptory necessity required the immediate evacuation of the city, it could not be accomplished under *four-and-twenty* hours, by the expiration of which time the head of each of the four columns would have advanced a no less distance than *seventy-five miles* from their respective gates, all the people being in *close* file, *four* deep.

"By comparing the numbers of the population with the area of the soil, we determine the density or proximity of the population. A French writer has proposed the term 'specific population,' after the analogy of 'specific gravity,' much in use in scientific works. The terms in common use, 'thinly populated,' and 'populous,' express the same idea, but in general terms.

"The following table shows the area of Great Britain in statute acres and square miles, also the number of acres to a person, the number of persons to a square mile, and the mean proximity of the population on the hypothesis of an equal distribution:—



"TABLE VII.—Area of Great Britain and Density of Population in 1851.

	Area.		Square (in Miles).	Acres to a Person.	Persons to a Square Mile.	Proximity of Persons in Yards.
	In Statute Acres.	In Square Miles.				
England .....	32,590,429	50,922	226	1·9	332	104
Scotland .....	20,047,462	31,324	177	6·9	92	197
Wales .....	4,734,486	7,398	86	4·7	135	162
Islands .....	252,000	394	20	1·8	363	99
Great Britain ..	57,624,377	90,038	299	2·7	233	124

"The ratio, or proportion in size, of the squares in the third column, is—England 51, Scotland 31, Wales 7, and islands  $\frac{2}{3}$ ; and the ratio of the population is about 17, 3, 1, and  $\frac{1}{2}$ .

"The 624 districts of England and Wales, classed in an order of density, range from 185,751 persons to the square mile, in the east London district, to 18 only in Northumberland. In all London, the number of persons to a square mile, in 1851, was 19,375. In 1801, the people of England were on an average 153 yards asunder; in 1851, only 108 yards asunder. The mean distance between their houses in 1801 was 362 yards; in 1851, only 252 yards. In London, the average proximity in 1801 was 21 yards; in 1851, only 14 yards."

The number of islands in the British group are 500, but inhabitants were only found on 175 on the day of the census.

"The population of the chief of the group, Great Britain, has been given; Ireland, as enumerated by another department, contained 6,553,357 inhabitants; Anglesey, the next most populous island in the group, had 57,318 inhabitants; Jersey, 57,020; the Isle of Man, 52,344; the Isle of Wight, 50,324; Guernsey, 29,757; Lewis, 22,918; Skye, 21,528; Shetland, 20,936; Orkney, 16,668; Islay, 12,334; Bute, 9,351; Mull, 7,485; and Arran, 5,857: 17 islands contained a population ranging from 4,006 to 1,064; 52 had a population ranging from 947 to 105; and the remaining 92 inhabited islands ranged from a population of 92 downwards, until at last we come to an island inhabited by one solitary man.

"The Report investigates at great length the territorial distribution of Britain from the earliest times, including the divisions made by the Romans and Saxons successively, and the state of things under the Heptarchy. It traces the division of the country into shires, hundreds, and tythings, to Alfred the Great; and the circuits to Henry II. (A.D. 1179). The terms 'hundreds' and 'tythings' had their origin in a system of numeration.

"The 196 reformed boroughs in England and Wales contain a total population of 4,345,269 inhabitants: the population of 64 range under 5,000; 43 from 5,000 to 10,000; 68 from 10,000 to 50,000; 14 from 50,000 to 100,000; 4 from 100,000 to 200,000; and 3 above 200,000. The city of London is still unreformed, and therefore not included in these. If inserted in the list, it would stand below Sheffield, as having a population of only 127,869 inhabitants, a *one nineteenth* portion of the population of London.

"Scotland contains 83 royal and municipal burghs, having a total population of 752,777 inhabitants: 55 have a population under 5,000; 16 from 5,000 to 10,000; 11 from 10,000 to 70,000; and 1, 148,000.

"The task," states the Report, 'of obtaining accurately the population of the Ecclesiastical districts was one of great difficulty. Designed exclusively for spiritual purposes, their boundaries are quite ignored by the general public, and rarely known by any secular officers; while, in many cases, even the clergy themselves, unprovided with maps or plans, are uncertain as to the limits of their respective cures.'

"The most important result which the census establishes, is the addition, in half a century, of *ten millions* of people to the British population. The increase of population, in the half of this century, nearly equals the increase in all preceding ages; and the addition, in the last ten years, of *two millions three hundred thousand* to the inhabitants of these islands, exceeds the increase in the last *fifty* years of the eighteenth century. Contemporaneously with the increase of the population at home, emigration has proceeded,

since 1750, to such an extent as to people large States in America, and colonies in all the temperate regions of the world. Two other movements of the population have been going on in the United Kingdom—the immigration of the population of Ireland into Great Britain, and the constant flow of the country population into the towns. The current of the Celtic migration is now diverted from these shores, and chiefly flows in the direction of the United States of America.”

We conclude our extracts with the two tables following, which may be useful for reference; and we trust our readers think, with us, that Mr. Cheshire has done good service by his publication, and deserves much credit for the ability and industry displayed in it.

*“Births, Deaths, and the Excess of Births over Deaths, in England and Wales, for the Ten Years from 1841 to 1850, inclusive.”*

Years.	Births.			Deaths.			Excess of Births over Deaths.
	Males.	Females.	Total.	Males.	Females.	Total.	
1841	262,714	249,444	512,158	174,198	169,649	343,847	168,311
1842	265,204	252,535	517,739	176,594	172,925	349,519	168,220
1843	270,577	256,748	527,325	175,721	170,724	346,445	180,880
1844	277,436	263,327	540,763	181,126	175,807	356,933	183,830
1845	278,418	265,103	543,521	177,529	171,837	349,366	194,155
1846	293,146	279,479	572,625	198,325	191,990	390,315	182,310
1847	275,658	264,307	539,965	214,375	208,929	423,304	116,661
1848	288,346	274,713	563,059	202,949	196,851	399,833	163,226
1849	295,158	283,001	578,159	221,801	219,052	440,853	137,306
1850	302,834	290,588	593,422	186,459	182,527	368,986	224,436

*“Emigration from Great Britain and Ireland in each Year from 1843 to 1852 inclusive, and the destination of the Emigrants.”*

Years.	Destination of Emigrants.				
	British North America.	United States.	Australia and New Zealand.	All other Places.	Total.
1843	23,518	28,335	3,478	1,881	57,212
1844	22,924	43,660	2,229	1,873	70,686
1845	31,803	58,538	830	2,330	93,501
1846	43,439	82,239	2,347	1,826	129,851
1847	109,680	142,154	4,949	1,487	258,270
1848	31,065	188,233	23,904	4,887	248,089
1849	41,367	219,450	32,191	6,490	299,498
1850	32,961	223,078	16,037	8,773	280,849
1851	42,605	267,357	21,532	4,472	335,966
1852	32,876	244,261	87,881	3,749	368,764

“It appears by this that the number of emigrants sailing from the United Kingdom in 1852 amounted, on an average, to upwards of a *thousand a day*.”

## REPORTS OF ASSURANCE COMPANIES.

*Industrial and General Life Assurance and Deposit Company.—Second Annual General Meeting, held 25th March, 1852.*—The report states that during the year just expired 1,766 policies have been completed, for sums amounting to £157,426. 0s. 5d., at premiums exceeding £5,562 per annum.

The entire business of the Company since its formation has been as follows:—

	Policies completed.	Amount Assured.		Annual Premium.	
		£.	s. d.	£.	s. d.
From the commencement of business, 26th February, 1850, to 14th February, 1851 . . . . .	1,218	103,717	4 9	3,475	2 11
From the 14th February, 1851, to 14th February, 1852 . . . .	1,766	157,406	0 5	5,562	6 6
Total in the first two years . .	2,984	261,123	5 2	9,037	9 5

Out of 40,000 shares, forming the capital stock of the Company, above 25,000 have been already subscribed for, and the remainder are being issued to such persons as are most likely to further the interests of the Company.

Nearly 3,000 persons have, during the last two years, availed themselves of the advantages of this Institution; the loss occasioned thereby to the Company, in thirteen instances, is only £893. 14s. 3d.

Anxious to carry out to the fullest extent the beneficial principles of life assurance, the directors deemed it desirable, at the early part of the past year, to form a branch under the Friendly Societies Act, which enables them to pay sums not exceeding £100 to surviving relatives without the trouble and expense of administration; and 911 policies have already been completed in this department.

The directors propose, in accordance with the deed of settlement, that a dividend after the rate of £5 per cent. per annum, to the 31st December last, be forthwith paid to the respective shareholders.

*Industrial and General Life Assurance and Deposit Company.—Adjournment of the Third Annual General Meeting of the proprietors and members, held 17th May, 1853.*—Mr. Neison read a report investigating the assets and liabilities of the Company. The following are some of the results of the valuation:—

The present value of the future premiums was £206,854, and of the sums assured £184,634, showing an excess of assets over liabilities under the existing policies of £22,220. Mr. Neison dwelt at some length upon the nature of this excess, and fully explained that it was not to be considered in any way as present or realized profit, but that it was the amount of profit which may be fairly expected to accrue in future years from the present business of the Company. It appeared that Mr. Neison, in his estimate, had taken a very stringent view of the liabilities of the Company; for he showed that had he employed a rate of interest which may undoubtedly be realized, the excess of assets over liabilities would have been considerably greater.

From the directors' report, it appeared that from the commencement of business, on the 26th February, 1850, to 14th February, 1853, the Company had issued 6,049 policies, assuring £464,709. 19s. 3d., and yielding annual premiums to the amount of £16,751. 9s. 2d. It also appeared that during the three months ending the 14th instant, there had been issued no less than 1,379 policies, assuring £74,758. 3s. 5d., and yielding premiums amounting to £2,666. 15s. 10d. yearly. The directors recommended in the report that a dividend of 5 per cent. should be paid to the shareholders for the past year.

The report stated that during the past twelve months, ending 14th February last, 3,065 policies have been issued, for £203,586. 14s. 1d., at premiums amounting to £7,713. 19s. 9d. per annum.

The progress of the Company has been as under :—

	No. of Policies completed.	Sum Assured.			Annual Premium.		
		£.	s.	d.	£.	s.	d.
From the commencement of business, on the 26th Feb., 1850, to 14th Feb., 1851 .....	1,218	103,717	4	9	3,475	2	11
From the 14th Feb., 1851, to 14th Feb., 1852.....	1,766	157,406	0	5	5,562	6	6
From the 14th Feb., 1852, to 14th Feb., 1853.....	3,065	203,586	14	1	7,713	19	8
Total.....	6,049	464,709	19	3	16,751	9	2

The business of the second year exceeded that of the first by nearly fifty per cent.; the business of the third year showed an excess of nearly equal proportion, and more than doubled the amount of the first. During the past financial year, the sum of £6,168 had been received as deposits on 12,336 shares; and of the 5,156 then remaining undisposed of, 1,560 have since been appropriated. The amount of life losses during the same year had been £1,590. 18s., arising from 25 deaths, making the total sum paid since the commencement, in respect of 39 deaths, £2,484. 12s. 3d.—a sum considerably less than the ordinary average.

The directors propose, in accordance with the deed of settlement, that a dividend after the rate of £5 per cent. per annum, to the 31st December last, be forthwith paid to the shareholders.

*Kent Mutual Life Assurance Society (1849).—Annual General Meeting of the Members, held July, 1851.*—The report stated that during the past year 293 policies have been issued, producing an annual income of £2,427. 2s. 2d., and assuring the sum of £66,990. 8s. 6d.; while 93 proposals have either been declined, not taken up, or awaited completion; making the total number of proposals received 386, to insure £88,732. 11s. 5d. The premiums received have been sufficient to meet the various expenses of the year, to pay off a portion of the preliminary charges, and to retain a balance in hand. The directors congratulate the members that no call has been made upon their guarantee fund of £20,000; although they have to regret the death of one of the members, and the consequent payment of a claim of £400.

The expenses of management have been unusually small, and have recently been considerably reduced by the arrangements made with the Kent Mutual Fire Insurance Society, for joint occupation of the offices, and division of many of the expenses.

*Kent Mutual Life Assurance Society.—Annual Meeting of the Members, held May, 1852.*—The report stated that the directors, under the belief that various important advantages would accrue to the Society from being incorporated under the Joint Stock Companies Act (7 & 8 Vict., cap. 110), without prejudice to the continued enjoyment, at the same time, of the Society's powers and privileges in virtue of its enrolment under the Friendly Societies Acts, the directors, in the course of last summer, took the step of having the Society incorporated under the Act aforesaid, and have now to lay the deed of constitution before the members. That deed

prescribes that the annual general meeting of the Society shall be held upon the first Thursday in May yearly, or within seven days next following thereafter; and in conformity with that provision the present meeting has been called. At the last annual meeting (7th July, 1851) the directors had the satisfaction of reporting to the members the result of the transactions of the Society since its formation in the previous year. In all, since the formation of the Society up to the 31st day of March last, there have been received 540 proposals, for the assurance of £134,839. 0s. 5d. Of these proposals, 420 have been accepted and completed, assuring £103,739. 14s., and yielding in premiums £3,663. 17s. 11d. The claims amount to £1,325. The directors have not taken, excepting in a very few cases, any risk on a single life beyond the sum of £1,000. All the engagements of the Society are guaranteed by an ample reserved capital. The board would beg to remind the members that, at the annual meeting in the year 1854, it will be the duty of the board to announce a division of profits.

The sum of 500 guineas for the past year having been voted to the directors, in accordance with the provisions of the deed of settlement, a special vote of £105 was passed to the chairman, and £10. 10s. was voted to the auditors for the past year.

*Kent Mutual Life Assurance Society.—Third Annual General Meeting of the Members, held 12th May, 1853.*—The report stated that, up to the period reported on at last annual meeting, the Society had issued 420 policies, assuring the sum of £103,739. 14s., and yielding a revenue of £3,663. 17s. 11d. In the course of the past year there have been received 271 proposals, for the assurance of £112,269. 3s. Of these proposals, 197 have been accepted and completed, assuring £69,918. 6s., and yielding an additional annual revenue of £2,287. 4s. 7d. Thus, the number of policies issued in less than three years from the actual working establishment of the Society is 617, assuring £173,658, and yielding a gross annual revenue of £5,951. 2s. 6d. After making the fullest provision for payment of the sums assured, and all the other debts and obligations of the Society, as at the 24th of March last, there is seen to be a sum of profit wholly the property of the members, under the constitution of the Society, amounting to £12,777. 11s. 5d.

The directors have pleasure in stating that, from the Kent Mutual Fire Insurance Society continuing to bear one half of nearly every expense, the two Societies being conducted in the same establishment, and the charges of principal officers, rent, taxes, and other charges being mutually divided between them, the large outlay of a separate establishment is avoided.

The claims arisen by deaths in the course of the past year amount to but two in number, and £700 in amount.

The whole sum lent to members in advances upon the security of their policies, and of sureties for the due payment of premiums, instalments, and interest at 5 per cent., since the formation of the Society, amounts to nearly £4,000, almost wholly composed of accumulated premiums.

The directors have resolved, in terms of the deed—"That it appears to the directors advisable that an act or acts of parliament, or letters patent, or a charter or charters of incorporation, better enabling them to carry on the business of the Society, should be forthwith obtained; and that the same should be recommended to the next ordinary annual general meeting for their sanction and adoption." And they now seek the sanction of the

members for adopting at the proper time this step, in conformity with the provisions of the constitution of the Society; it being also provided by the deed—"That every power and authority by these presents given to any extraordinary general meeting of the Society, and every matter or thing by these presents expressly required to be discussed, done, or sanctioned by or at an extraordinary general meeting only, may, if the directors shall so think fit, be exercised, discussed, done, or sanctioned by or at the ordinary general meeting in any year, provided that full notice be given of the intention to exercise, discuss, do, or sanction the same at such ordinary general meeting; and that such power, authority, matter, or thing is by these presents (except under this present clause) expressly authorized to be exercised, done, discussed, or sanctioned at or by an extraordinary general meeting only."

The receipts from the 31st of March, 1852, to the 24th of March, 1853, were £7,399. 9s. 6d., and the expenses, £1,494. 3s. 9d. The assets amount to £69,908. 10s. 2d., and the liabilities to £57,130. 18s. 9d., showing a balance of £12,777. 11s. 5d. The sum of £500 was voted to the directors for their services.

*Balance-sheet from 31st March, 1852, to 24th March, 1853.*

	<i>Receipts.</i>	£.	s.	d.	£.	s.	d.
Balance at bankers . . . . .		443	11	9			
Ditto in hand . . . . .		12	19	2			
					456	10	11
Policy premiums . . . . .		1,744	18	3			
Renewal ditto . . . . .		2,672	6	9			
					4,417	5	0
Loan fund . . . . .		1,395	0	0			
Advance from guarantee fund, as provided by directors . . . . .		150	0	0			
					1,545	0	0
Expenses on loans to policy-holders . . . . .		104	4	3			
Instalments on ditto . . . . .		734	9	3			
Interest on ditto . . . . .		96	14	6			
					935	8	0
Interest on half credit premiums . . . . .		13	19	6			
Commission on reinsurance . . . . .		6	15	0			
					20	14	6
Investigation fees . . . . .					16	16	0
Agents' balances . . . . .		6	12	9			
Ditto as per contra, included . . . . .		1	2	4			
					7	15	1
					£7,399	9	6
	<i>Expenditure.</i>	£.	s.	d.	£.	s.	d.
Policy claims paid . . . . .					700	0	0
Loan fund . . . . .					719	13	4
Loans to policy-holders . . . . .					2,755	0	0
Guarantee fund . . . . .		£25	0	0			
Interest on loan and guarantee fund . . . . .		60	19	7			
					85	19	7
Renewal premiums due . . . . .		38	4	0			
Agents' balances . . . . .		75	9	6			
					113	13	6
Loans to policy-holders on postponed premiums, bearing interest at 5 per cent. per annum . . . . .					335	3	4
Premiums on reinsurance . . . . .		£71	18	8			
Commission on ditto . . . . .		10	0	0			
Surrender of policies . . . . .		20	5	9			
					102	4	5
Carried forward . . . . .					£4,811	12	4

# *Reports of Assurance Companies.*

159

		£.	s.	d.
	Brought forward			4,811 14 2
Preliminary and law charges		£204	16	4
Policy stamps		73	2	6
				277 18 10
<b>Management charges :—</b>				
Printing, stationery, and engraving		136	10	6
Advertisements		66	11	10
Postage stamps		25	0	1
Commission, home and bank		55	0	5
Agents' commission and charges		74	1	2
Travelling expenses		13	18	0
Medical fees		46	3	2
Introductory fees		13	2	6
Receipts and bond stamps		8	1	3
Office expenses, furniture, &c.		34	3	0
Carriage and booking		4	18	4
Miscellaneous expenses		12	3	11
				489 14 2
Directors' attendances		360	14	6
Medical officers		100	0	0
Auditors		10	10	0
				471 4 6
Salaries		428	6	4
Rent and taxes		76	4	3
Insurance		0	7	6
Messenger		28	7	0
				533 3 1
Balance at bankers		799	10	5
Ditto in hand		15	19	10
Policy stamp		0	2	6
				815 12 9
				£7,399 9 6

## *Liabilities.*

	£.	s.	d.
Present value of sums under assurance to the 24th March, 1853	54,862	19	2
From guarantee fund of £4,250	425	0	0
Loan fund	1,675	6	8
Auditors	21	0	0
Medical officers	50	0	0
Salaries	18	15	0
Commission and agents' balances	31	12	0
Rent	18	15	0
Reassurance premiums	27	10	2

	57,130 18 9
Balance in favour of the Society	12,777 11 5

£69,908 10 2

## *Assets.*

	£.	s.	d.
Present value of the premiums payable for policies current at this date, the 24th March, 1853	61,105	14	2
Balance of loans to members, bearing interest at 5 per cent.	3,103	14	1
Loans to policy-holders on postponed premiums, bearing interest at 5 per cent.	335	3	4
Guarantee fund	4,250	0	0
Value of furniture	183	19	10
Due by agents	75	9	6
Ditto by renewal premiums	38	4	0
Ditto by bankers	799	10	0
Ditto by secretary, balance cash	15	19	10
Stamps in hand	0	15	0

£69,908 10 2

M 2

*Kent Mutual Fire Assurance Society.—Annual Meeting, held 30th June, 1852.*—The report states, that up to the 29th October, 1851, 5,500 policies had been issued, insuring property to the amount of £2,217,953. During the past two years the business of the Society has been nearly doubled. Up to the present time the number of policies issued borders upon 7,000, representing annual premiums to upwards of £4,000, and insuring property to the amount of £3,763,978.

*Law Life Assurance Society (1823).—Summary showing the General Assets of the Society on the 31st December, 1850, consolidating the Guarantee and Assurance Funds.*

	£.	s.	d.	£.	s.	d.
Balance of the assurance fund on 31st December, 1849	2,945,497	8	9			
Balance of the guarantee fund on ditto	457,229	6	6			
Total general balance for 1849				3,402,726	15	3
Received during the year 1850:—						
New premiums	14,723	3	9			
Renewal premiums	297,606	19	2			
Profit and loss	97,879	8	2			
				410,209	11	1
				3,812,936	6	4
Paid during the year 1850:—						
Claims on death	166,066	0	0			
Bonuses on ditto	41,007	0	0			
Sundries	13,045	2	8			
Charges for management (including law charges)	6,200	8	11			
				233,318	11	7
Total general balance, being the amount of the assets of the Society on 31st December, 1850				£3,579,617	14	9
Of which the guarantee fund amounts to	£457,229	6	6			
“ assurance fund “	3,122,388	8	3			
				£3,579,617	14	9

*Law Life Assurance Society.—General Meeting, held February, 1852.*—The report stated that the guarantee fund, comprising assets, consisting of mortgages, funds, &c., was £457,229—that during the year 1851 there had been received, on new policy premiums £13,159; renewal premiums, £299,237; profit and loss account, less commission, £93,514; making for the year, £405,911, which, added to the assurance fund of £3,122,388, made a total of £3,528,299—that the disbursements for the year 1851 (consisting of charges of management, £6,458; claims on deaths, &c., £142,353; bonuses, 38,525; surrendered policies, £7,595; law charges, £221) amounted to £195,152 only, and left a balance of assets of £3,333,147, invested on mortgages, stock, &c. The interest and dividend income exceeded the sum required to pay the 36s. per share, and would enable the directors to give a further bonus of 2s. 6d. per share, in addition to the septennial bonus; and they hope from some source to give a like bonus for the rest of the present septennial period. The balance of assurance fund to December, 1850, was £3,122,388; balance guarantee fund, of same date, £457,229, making £3,579,617; to which add receipts for 1851, £405,911; and, deducting the payments, left the total balance of assets for December, 1851, £3,790,376.

The chairman congratulated the proprietors and assurers on the satis-



factory state of their affairs. The Company was now in a different position to what it was when first established, 30 years ago; there were then 27 to 30 Offices—now there are 167 Offices. Every new Office takes a portion from the old Offices, and diminishes their business, even if the new ones do not answer; but this Company's business was not diminished, but had increased over the last year. It was necessary for their friends to exert themselves. The lives dropped were less than the preceding year by £33,000, and that year was £29,000 less than the year before; so that their losses were £62,000 less than in 1849. The increase to capital was £210,000, the average addition since 1841 having been £178,000. There had been only one disputed policy since the Company began, and that was a very gross case. The Company had paid policies from the commencement to the amount of £2,680,000. As regarded the Irish estates in Galway, held on mortgage, the director had taken every means to carry out the resolution of the shareholders to treat for the estates, and he had reason to anticipate they would be carried out in the course of a few months; Mr. Beckett had put it in a train in Ireland perfectly satisfactory. The shareholders were entitled, by the deed, to all the interest of the guarantee fund, and every seven years were paid it in dividends; but there was also a surplus reserved; that, and the additional interest raised on mortgages, justified the directors in now paying 2s. 6d. bonus. The policies for the year were 401.

A member suggested the propriety of accepting £1 an acre for the claim, which the chairman said would cover all the claims of the Company; and in answer to further questions, it was said that the number of existing policies was 8,000, being 79 more than the preceding year, as only 322 had gone off.

*Law Property Assurance and Trust Society* (established in 1850, for the purpose of facilitating the settlement, sale, mortgage, and redemption of property, and the security of families by the application of the principle of assurance to property as well as to life).—*First Annual General Meeting, held June, 1851.*—The report stated that 313 proposals had been received during the past year, of which 192 have been completed and are now in force, yielding an annual income of £2,234. 16s. 3d. In addition to these, 27 more have been accepted and are in process of completion.

Not a single life policy has become a claim.

The confidence with which the plans of this Society are viewed by the public is evinced by the fact that all the shares in the capital stock of the Society are subscribed. And the directors, continuing to receive applications for further allotments, have found it expedient to declare forfeited such shares as had not been taken up; and in order to extend as widely as possible the interests of the Society, they have resolved to issue the few remaining forfeited shares only in small lots.

The entire fixed annual charge upon the Society's funds, including the salaries of secretary, medical officer, clerks, and porter, with rent and taxes, does not exceed £800 per annum. Thus already the annual income is much more than double the fixed expenditure.

The chairman, in moving the adoption of the report, said that the preliminary expenses—that is to say, the entire cost of forming and establishing the Society up to the date of complete registration, including all the expenses of registration, the legal expenses of the deed of settlement, services, advertising, and every cost incidental to the formation of a Company—did not in

this Society exceed £1,200, whilst the income was already more than £2,200 a year. They had succeeded in buying off the entire furniture of an extinct Company, which had cost £800, for £200. The entire of the house in which they were assembled was obtained at a rent of £75 a year, and with the rates and taxes did not cost them £100 a year. Their arrangements with their officers made a present charge of only £700 a year, it being agreed with their secretary that he should share their fortunes, his remuneration being regulated by the future success of the Society.

It was another pleasing circumstance that all their shares are subscribed; that only some of the forfeited shares remained, not exceeding 350; and that for these there were applications, only that the board had resolved to issue them in small lots, so as to extend the connections of the Society.

The sum of £250 was voted to the directors, and £40 to the auditors, for their services during the past year.

*Law Property Assurance and Trust Society.*—*Second Annual General Meeting, held June 11th, 1852.*—The report stated that during the second year 284 policies have been issued, upon which £2,711. 1s. 4d. have been actually received in premiums, and yielding an annual income of £3,621. 19s. In addition to this, annuities to the amount of £150 have been granted, for which £1,760 purchase-money has been received. Only one policy, and that for the small sum of £50, has become a claim since the establishment of the Society.

The total number of proposals received to this time is 612, of which 476 have been completed, 1 has become a claim, 7 have lapsed, and 25 remain to be completed; and the total annual income of the Society, on the 17th May, 1852, amounted to £5,366. 14s. 8d., composed of £5,053. 19s. 4d. from policies, and £312. 15s. 4d. interest on money invested.

The directors have already invested the sum of £6,255. 7s. 5d. upon good securities, yielding 5 per cent. interest.

A local committee has been formed at Manchester, comprising the leading members of the legal profession in that important locality.

The sum of £250 was then voted to the directors for their services, and £21 to the auditors.

*General Balance-sheet, from May 17, 1850, to May 17, 1852.*

Dr.	£.	s.	d.	£.	s.	d.
Capital—						
Paid up from May 17, 1850, to May 17, 1851 . . .	3,532	8	6			
Ditto from May 17, 1851, to May 17, 1852 . . .	4,417	11	6			
				7,950	0	0
Unpaid on deposits . . . . . £117 10 0						
Ditto on 1st call . . . . . 520 0 0						
Ditto on 2nd call . . . . . 1,412 10 0						
				2,050	0	0
				£10,000	0	0
Profit and loss—				£.	s.	d.
Balance from May 17, 1850, to May 17, 1851 . . .	640	15	9			
Ditto, after deducting directors' and auditors' fees, and shareholders' dividends, from May 17, 1851, to May 17, 1852 . . . . .	3,155	9	0			
				3,796	4	9
				£11,746	4	9

<i>Cr.</i>	£.	s.	d.	£.	s.	d.
Preliminary expenses, law charges, printing, stationery, advertisements, account books, and sundries, from May 17, 1850, to May 17, 1851	1,162	3	7			
Additional ditto, incurred from May 17, 1851, to May 17, 1852.	853	2	1			
	2,015	5	8			
Less, amount written off to profit and loss account, from May 17, 1850, to May 17, 1851	£50	0	0			
Ditto this year	196	0	0			
	246	0	0			
Office furniture				1,769	5	8
Lease of premises, Essex Street, Strand				249	17	0
Amounts invested in loans to this date				379	2	4
Ditto due from sundry agents to this date				6,255	7	5
Cash in hand—				855	12	9
Bankers				2,212	15	6
In hands of secretary				24	4	1
				2,236	19	7
				£11,746	4	9

*Statement showing the progressive improvement in Business and Profits since the formation of the Society.*

	Number of Policies issued.	Capital paid up.	Premiums received for Life Assurances and Annuities.	Net Profits, exclusive of Policy risks.
From 17th May, 1850, to 17th May, 1851.....	192	£. s. d. 3532 8 6	£. s. d. 1432 0 4	£. s. d. 640 15 9
From 17th May, 1851, to 17th May, 1852.....	284	4417 11 6	5903 1 8	3155 9 0
	476	7950 0 0	7335 2 0	3796 4 0

*Profit and Loss Account, from May 17, 1851, to May 17, 1852.*

<i>Dr.</i>	£.	s.	d.	£.	s.	d.
Office expenses and salaries—						
Petty cash	402	13	1			
Rent and taxes	62	12	7			
Salaries	481	3	8			
Charges	62	16	1			
				1,009	5	5
Advertisements				196	12	5
Printing and stationery				703	4	10
Commission				223	11	4
Medical fees				89	6	0
Cross assurances				127	3	3
Preliminary expenses, £1,965. 5s. 8d.—It is proposed to liquidate these expenses by writing off £196 per annum to this account for 10 years;						
say				196	0	0
Directors' attendance and auditors' fees				324	2	11
Annuity paid				12	10	0
Shareholders' dividends				93	4	4
Balance, being net profit (exclusive of policy risks)				3,155	9	0
				£5,180	9	6

Cr.	£.	s.	d.	£.	s.	d.
Premiums received from May 17, 1851, to May 17, 1852	4,143	1	8			
Consideration-money received for annuities	1,760	0	0			
				5,903	1	8
Shareholders' interest on overdue calls				3	9	8
Interest on loans				223	18	2
				£6,130	9	6

## Statement of Assets, May 17, 1852.

	£.	s.	d.
Agents' balances	855	12	9
Loans	6,255	7	5
Lease of house	379	2	4
Office furniture	249	17	0
Calls on shares unpaid	2,050	0	0
Cash at bankers	£2,212	15	6
Balance in the hands of secretary	24	4	1
	2,236	19	7
	£12,026	19	1

## Supplemental Statement of Receipts and Expenditure during the two years ending May 17, 1852.

Dr.	£.	s.	d.
Capital	7,950	0	0
Premiums received	£5,575	2	0
Annuities	1,760	0	0
	7,335	2	0
Interest on overdue calls	3	9	8
Ditto on loans	223	18	2
	£15,512	9	10
Cr.	£.	s.	d.
Preliminary expenses	2,015	5	8
Office furniture	249	17	0
Lease of premises	379	2	4
Loans	6,255	7	5
Policy stamps	16	12	6
Charges	23	2	11
Petty cash	618	8	3
Medical fees	145	8	0
Salaries and sundries	722	17	0
Rent and taxes	202	3	1
Directors' attendance and auditors' fees	324	2	11
Commission	324	9	0
Advertisements	196	12	5
Cross assurances	137	9	10
Annuities paid	12	10	0
Printing and stationery	703	4	10
Shareholders' dividends	93	4	4
Agents' balances	855	12	9
Balance at bankers	£2,212	15	6
Cash in hands of secretary	24	4	1
	2,236	19	7
	£15,512	9	10

*Law Property Assurance and Trust Society.—Third Annual General Meeting, held June 17th, 1853.*—The report stated, that since the date of the last report 330 proposals have been under the consideration of the

board, and 314 policies have been issued; the sum thus assured being £101,315. 9s. 5d. The increase of annual income, arising from new policies, now amounts to £4,385. 17s. 8d. Annuities amounting to £46. 5s. 2d. have been granted, for which £470. 8s. 5d. purchase-money has been paid to the Society.

During the past year three claims have been made in respect of policies, and £1,153. 8s. 4d. have been paid in liquidation of them. The above are, however, the only claims of any kind which have arisen since the establishment of the Society.

The total number of proposals for assurance in the various branches of the Society's business, during the three years which have elapsed since its formation, has been 942, of which 754 have been completed, and there are now 47 proposals in the office which have been accepted.

The present annual income of the Society, from all sources, is £9,231. 4s. 11d.

The sum of £400 was voted to the directors, and 15 guineas to each of the auditors, for their services during the past year.

*Statement of Receipts and Expenditure for the year ending  
17th May, 1853.*

<i>Dr.</i>						
To cash balances, May 17, 1852—	£.	s.	d.	£.	s.	d.
At bankers' . . . . .	2,212	15	6			
In hands of secretary . . . . .	24	4	1			
Balance in agents' hands . . . . .	855	12	9			
				3,092	12	4
Capital paid up from 17th May, 1852, to 17th May, 1853 . . . . .				1,112	10	0
Premiums received on new policies effected from 17th May, 1852, to 17th May, 1853 . . . . .				2,963	14	11
Renewal premiums received during the same period . . . . .				2,987	14	5
Consideration money received for annuities . . . . .				470	8	5
Shareholders' interest on overdue calls . . . . .				0	17	8
Interest on loans . . . . .				356	4	3
				£10,984	2	0
<i>Cr.</i>						
By office expenses and salaries, as under—	£.	s.	d.	£.	s.	d.
Salaries . . . . .	599	10	4			
Rent and taxes, Offices, Exeter Street . . . . .	115	0	9			
Ditto, Manchester . . . . .	50	0	0			
Office furniture, Manchester . . . . .	78	1	7			
Petty expenses, including postage stamps . . . . .	292	9	8			
Wages . . . . .	96	9	4			
Sundry charges . . . . .	28	4	11			
Fire insurance . . . . .	13	10	0			
				1,273	6	7
Advertisements . . . . .				923	18	11
Printing and stationery . . . . .				735	16	11
Commissions . . . . .				387	17	4
Medical fees . . . . .				156	19	6
Reassurances . . . . .				276	0	4
Law expenses . . . . .				146	0	8
Travelling expenses . . . . .				220	5	3
Repairs to house . . . . .				18	5	3
Expenses attendant on agency extension . . . . .				169	3	1
Directors' and auditors' fees . . . . .				291	0	0
Premiums returned for policies surrendered . . . . .				91	18	1
				£4,690	11	11
Carried forward . . . . .						

	Brought forward	£4,690	11	11
Annuities paid			160	17 7
Shareholders' dividends			242	1 1
Claims paid during the year ending 1853			1,153	8 4
Amount advanced on mortgage and other securities			3,171	8 9
Balance in the hands of agents			633	2 11
Ditto at London and County Bank	£840	14	5	
Cash in hands of secretary		19	18	7
Manchester agency, cash on hand		71	18	5
Cash balance on hand			932	11 5
		£10,984	2	0

	Assets.	£.	s.	d.
Agents' balances		633	2	11
Loans		9,426	16	2
Lease of house		397	7	7
Office furniture, Essex Street		249	17	0
Ditto, Manchester		78	1	7
Call on shares unpaid		937	10	0
Cash at bankers	£840	14	5	
In hands of secretary		19	18	7
Manchester branch		71	18	5
		932	11	5

Total amount of assets . . . . . £12,655 6 8

	Liabilities.	£.	s.	d.
Printing and advertising		232	10	0
Rent and taxes		40	0	0
Law expenses		119	9	5
Salaries to May 17, 1853		161	5	0
Directors' and auditors' attendance fees		270	0	0

Total amount of liabilities . . . . . £823 4 5

*Receipts and Expenditure for the three years ending 17th May, 1853.*

Dr.	£.	s.	d.
Capital paid up from 17th May, 1850, to 17th May, 1853	9,062	10	0
Amount received from 17th May, 1850, to the 17th May, 1853	11,434	13	3
Consideration money received for annuities	2,230	8	5
Interest on overdue calls	4	7	4
Interest on loans	585	1	1
	£23,317	0	1

Cr.	£.	s.	d.
Claims paid since the Society commenced business	1,153	8	4
Annuities paid	173	7	7
Interest paid proprietors	335	5	5
Reassurance premiums paid	413	10	2
Expenses of management, including commission to agents, medical fees, and directors' and auditors' attendance fees	7,508	6	3
Preliminary expenses	2,015	5	8
Lease of premises, Essex Street	£397	7	7
Office furniture, Essex Street	249	17	0
Moneys advanced on mortgage and other securities	9,426	16	2
Balance in the hands of agents	633	2	11
Manchester agency, office furniture	78	1	7
Balance at London and County Bank	£840	14	5
Cash in hands of secretary	19	18	7
Manchester agency, cash on hand	71	18	5
	932	11	5
	11,717	16	8
	£23,317	0	1

*Legal and Commercial Life Assurance Society (1845).—Annual General Meeting, held May, 1851.*—The report stated that the number of policies issued in 1849 was 235, creating assurances to the amount of £89,834. 7s. 6d., on which the premiums received amounted to £2,756. 7s. 2d. During the past year 337 proposals have been submitted to the directors, of which 279 have resulted in policies, assuring £104,360. 12s., on which the premiums are £3,566. 12s. 7d. The loans granted during the past year have amounted to £11,888. 10s. on real and personal security: the cases on real security being 9, and amounting to £9,288. 10s.; and on personal security 19, and amounting to £2,600: this branch of the Society's business has progressed very favourably. The number of new agents appointed during the past year is 113, making the total number of agents 560. During the four months of the present year the income of the Society has been at the rate of upwards of £11,000 a year. The new features introduced during the last year by the actuary, and the modification of the tables of premiums, have attracted considerable attention, and contributed materially to advance the interests of the Society.

In the course of his address, the chairman stated the following facts:—During the first year 176 policies only were issued, for a sum amounting to £75,000, yielding premiums to the extent of £1,952. 17s. 11d. In the following year 152 policies were added, for £65,000, the premiums amounting to £1,631. 4s. 5d.; and in 1848 no less than 164 policies were taken out, for £59,000, the premiums being £1,493. In 1849 the policies issued were 233, for a sum amounting to £89,834, yielding £2,756 in premiums; while last year the policies numbered 279, for £104,360, and yielding premiums to the extent of £3,566. 12s. 7d.; showing that the increase in one year, namely, from 1849 to 1850, was from £2,756 to £3,556. In 1849 we found our income amounted in premiums to £5,938. 6s. 9d., which, added to the interest received on loans, amounted to the sum of £7,087; while in last year we find the premiums were increased from £5,933 to £8,846, which, added to the interest received to the end of the year on loans, make a sum of £10,053. The sums out on loan amount to £20,000, yielding interest to the extent of £1,000 a year net. It was determined that there should be no bonus given to the shareholders until the division of profits at the end of the fifth year, to be apportioned in the ratio of four-fifths to the policy-holders, and one-fifth to the shareholders, the amount apportioned to the policy-holders being about 35 per cent. upon their premiums.

A resolution was then passed, authorizing the board to pay the shareholders 4 per cent. interest upon the paid-up capital; and afterwards it was agreed that in future the remuneration of the directors should be increased from 400 to 500 guineas per annum.

The chairman then requested the actuary to read the quinquennial report, which was to the following effect:—"The first quinquennial period of the Company having terminated at the end of last year, your directors have now another important duty to perform—that of laying before the meeting, agreeably to the provisions of the deed of settlement, the result of an investigation of the Society's affairs for the five years ending December 31st, 1850; and of declaring a bonus out of the profits which have accrued during that period. The number of policies issued during the last five years was 1,006, of which 749 remain in force, producing an annual income of £8,441. 17s. 6d. The average age of the lives assured

is 35, and the average amount of policies £389. The claims on the Society since its formation, arising from death in eleven cases, have amounted to £5,298. The premiums received by the Society on policies which have lapsed by death or otherwise, amount to £4,195. 0s. 7d. The estimated value of the assets, including the present value of future premiums, is £156,441. 0s. 2d.; and the amount of the liabilities, including the present value of the risks on subsisting assurances, is £140,033. 11s. 7d. The above statement exhibits a balance in favour of the Society of £16,407. 8s. 7d.; but it is your directors' duty to remind you, that of this balance the sum of £9,692 is not capable of present division, without anticipating the profits to arise in future years from the present business of the Society: this practice, your directors are aware, has been pursued by some Offices, but they deprecate the principle so strongly, that they cannot recommend it for adoption by this Society. The directors feel, however, that they can with propriety, and with a due regard to the necessary reserves for future contingencies, declare a bonus of 5 per cent. to the shareholders on their paid-up capital, to be added to the shares, and a reversionary bonus to the policy-holders entitled to participate in the present division, which will average 35 per cent. on the amount of premiums paid. This reversionary bonus will be added to the sum assured, or may be converted into an equivalent abatement of future premiums, at the option of the assured."

This report gave rise to some discussion as to the power of the directors to add the bonus to the paid-up capital, with a view of its carrying interest; but ultimately it was agreed that the matter should be left in the hands of the directors, to be disposed of in committee.

*Legal and Commercial Fire Assurance Society (1847).—Annual Meeting, held 3rd July, 1851.*—The fourth annual report of the directors to the shareholders stated that during the year the agents appointed, the number of policies issued, and the income derived, have all been considerably augmented. The new policies issued have been 2,543 in number, averaging £817 each, whilst the original and early assurers have continued their support to the Office. The income of the Society has been raised from £8,228. to £10,290, or 25 per cent. increase: on the other hand, the expenses of the Office have been reduced. One hundred and twenty-one new appointments have been made of agents in good standing as professional or business men. The total number of agents is now 587.

It will be observed that the claims paid in the year are larger than the proportion paid in previous years: viz., £7,465; but this includes £5,000 belonging to the last year, as reported at the annual meeting.

The gross amount of premiums received in the past four years, as compared with the claims paid, show decidedly that the business of the Office is well selected, and the claims only on a fair average: thus, the gross premiums received have been £28,256, and the claims paid £15,947.

The directors have deemed it advisable to become subscribers to the London Fire Engine Establishment, at a future cost of £400 per annum, whereby the large sum now assured by the Office in London comes under the charge of trained and experienced firemen, who not only attend to stay the progress of the flames, but after extinguishing a fire remain in charge of the premises for the protection of the salvage; thus rendering important services to the Office.



The directors recommend that interest, at the rate of 5 per cent., be paid to the shareholders on the amount of their paid-up capital. This resolution was carried.

*Legal and Commercial Fire Assurance Society.—Fifth Annual Report, at the Annual Meeting, held 1st July, 1853.*—Previous years have shown a rapidly increasing business of a profitable nature; but the last year exhibits a larger amount of income than any former, whilst the claims have been less in amount than usual. The balance-sheet shows that the income is £12,650. 1s. 1d., compared with £10,290. 1s. 5d. for the former year, being an increase of £2,359. 19s. 8d., or about 23 per cent. Although a larger number of new policies has been issued than in any former year (viz., 2,681), and the business has materially increased, yet there has been no extraordinary expenditure; on the contrary, the charges of management are but slightly more than they were in the two preceding years. The claims upon the Society for the past year amount to £5,959. 6s. 11d., being less than the sum paid during the former year, which was £6,705. 15s. 11d. The directors recommend the payment of interest on the paid-up capital of the Society, at the rate of 5 per cent.

*Life Association of Scotland (1838).—Fourteenth Annual Meeting, held 9th June, 1853.*—During the year ending 5th April, 1853, the Association issued 1,257 new policies for life assurances, amounting to £466,754: the annual premiums receivable for these amount to £15,276. Policies for 22 annuities and 8 endowments were also issued during the year, for which £5,416 was received. The total number of new transactions was therefore 1,287; and the total sum payable during the year to the Association on account thereof was £20,692. Of these policies, 665 were issued in Scotland, 583 in England, and 39 in Ireland. Since the establishment of the Association there have been issued 6,292 life assurance policies, for nearly two millions and a half pounds (£2,310,908). The annual income for the year, from premiums and interest, was £67,897. During the year 49 policies for life assurances, amounting to £23,235, have fallen by deaths.

The usual valuation of the assets and liabilities has been made. The surplus continues to increase in proportion to the business; and the portion divisible for the year enables the directors to allow an abatement of 35 per cent., or 7s. per £1, from the current year's premiums of those policyholders in the participating class who entered on or before 5th April, 1849.

The directors made the two following additions to their regulations during the year. These were suggested by the Association's experience and the practice of other Offices, and were adopted after mature deliberation:—

1. Holders of life assurance policies for not less than £500 (excepting those for short periods and survivorships) may retain in their hands one half of the annual premiums payable until they become entitled to participate in the profits; the unpaid half premiums remaining a debt on the policy during the pleasure of the assured, and bearing interest payable in advance.

2. Policies in the participating class effected subsequent to the 5th of April, 1853, shall be of five years' standing at the close of the period for which profits are declared, in order to entitle the holders to participate therein.

*Liverpool and London Fire and Life Assurance Company (1836).—Report to the Fifteenth Annual General Meeting, held February 13th, 1851.*—The capital of the Company remains as at the date of the last report. In the fire department, the premiums, which in 1849 were £36,517, amounted last year to £42,928; and the losses were only £7,415, against £18,638 in 1849. The premiums received in the life department during the last year are in excess of those of any preceding year, whilst the claims that have been paid in the course of it are considerably less than those of 1849. The directors, by virtue of the powers given them by two special meetings of the proprietors, have constituted and empowered a board of directors in New York. A similar proceeding is in contemplation in respect to the three presidencies of India. The directors had requested two clauses to be prepared, to be embodied in the supplemental deed, giving them power to regulate the reserved funds of the Company, so as to render them sufficient for any probable emergency; and stated that all the changes which have been made in the constitution of the Company, since its establishment in 1836, have been introduced into the supplemental deed, and if that be approved by the present meeting, it will be necessary to confirm it at another meeting to be convened expressly for that purpose. The reserved surplus fund remains as at the date of the last report, £130,002. 10s. The profit and loss account shows a balance of £54,403. 13s., from which to take the dividend of the year. A dividend was declared of 7s. 6d. a share, but free of income tax instead of subject to it, and less 5 per cent. on the uncalled capital in the case of those shares on which £2. 10s. have not been received: and when that has been paid there will remain at the credit of this account the sum of £29,568. 18s., as a reinsurance fund against current risks.

*Liverpool and London Fire and Life Insurance Company.—Sixteenth Annual General Meeting of the Proprietors, held February, 1852.*—The report stated that the establishment of a board in New York, the acquisition of the business and connection of the Australasian Life Insurance and Annuity Company, and the opportunity of adding to the proprietary gentlemen of influence in their respective neighbourhoods, have led to an increase in the number of shares issued, which now amount to 78,679.

The business of the Company in the fire department has this year been extended, as well in the United Kingdom as in the United States and other countries abroad; the result of the year's operations in this department will compare very favourably with the past experience of the Company.

The business in the life department comprises the issue of 231 policies, insuring £152,755, and producing in premium £5,832. 14s. 11d.; and also the issue of 12 annuity bonds, for the payment of £506. 11s. a year. As already intimated, a transfer has been obtained of the business of the Australasian Life Insurance and Annuity Company, a small but highly respectable concern, whose individual expenditure proved too great for the extent of their business, unquestionably good though that was. By this arrangement, which takes effect from the 1st September last, the Company's income from life premiums is made upwards of £45,000 a year; and the Company itself will be favourably introduced in the Australasian colonies and our eastern possessions.

The directors have this year gone to considerable expense in establishing a body of agents, who, from their respectability and efficiency, will suitably represent the Office at their different stations.

In accordance with the provisions of the deed of settlement, the premium received on the shares issued during the year has been carried to the credit of the reserved fund, which now amounts to £133,537. 10s.

The balance at the credit of the profit and loss account is the fund from which to take the dividend for the year. The directors, having carefully reviewed the circumstances of the Company, now appoint and declare, subject to the approval of this meeting, a dividend of 10s. per share, less income tax, and 5 per cent. on the uncalled capital in the case of those shares on which £2. 10s. have not been received. †

The chairman, in moving the adoption of the report and accounts, remarked that, as regarded the fire department, there had been an increase of 25 per cent. on the amount of premiums; and of this sum a considerable increase had taken place on the amount of up-town property—house insurances, and property of that class—which had not been less than 20 per cent. In connection with the increase on the fire insurance on commercial property, there had been a large increase in the life business, and he thought he should be under the mark in saying that this amounted to 60 per cent. A very large increase had been made to the number of agencies, those in this country alone amounting to 240. They had been very successful in their fire risks during the year. They had had several losses in life; but, out of 1,400 insured, this had amounted to only twenty-three or twenty-four lives which had dropped off during the year.

The sum of £800 was placed at the disposal of the directors, to divide amongst themselves as they thought fit.

The secretary, Mr. Boulton, in returning thanks to the chairman for the manner in which he had introduced the resolution of the vote of thanks to him to the proprietors, stated that it was just sixteen years ago since he first conceived the idea of establishing in Liverpool a Fire and Life Insurance Company. In the years 1842 and 1843, the fires had been so numerous and disastrous that it was found necessary considerably to increase the amount of premium paid on those risks. While, however, the directors gave attention to attain for the proprietors such amounts as the risks required, they adopted a suggestion he had submitted to them—that the exterior of warehouses should be rendered fire proof, in order that the effect of fire should not be so terrific as previously. This was afterwards embodied in the Act of Parliament known as the Fire Prevention Act, which had been carried out with great advantage to the Company, and had enabled them to reduce the premiums safely, until they were now lower than they had been for 25 years. In the years 1842 and 1843, within a period of 40 weeks, they had paid a sum of not less than £90,000 for losses occasioned by fire; indeed, they might at that period be said to have recommenced the Company. They had absorbed nearly the whole of their reserved fund, and all that might be said to have been left was the connection which had been formed. Since that time the proprietors, independent of interest, had been paid in hard cash £4. 5s. per share upon a £2. 10s. stock; and their shares were now worth £12 to £12. 10s.

*London and County Life and Fire Assurance Company (1851).—First Meeting of the Proprietors and Policy-holders, held September 22, 1852.*—The report stated that on the 17th of June, 1851, the Company was projected and provisionally registered by Wm. Thos. Stephens and Wm. Newton, with the assistance of Mr. F. R. Jones; and on the 26th of

August a meeting was called, when it was resolved to form the said Company. The directors' attention was thereafter entirely engrossed by the deed of settlement until the preparation of that document was completed, when signatures representing 5,110 shares were obtained thereto. On the 17th of October, 1851, the Company became completely registered.

In the share department three calls of 5s. each have been made, which, including deposits, make 15s. 6d. per share. The total number of life proposals received and accepted are 394, assuring £40,881. 12s., and of which the annual premiums amount to £1,520. 13s. 2d.; several proposals have also been received and declined. The directors congratulate the meeting upon the fact of there being no loss in the life department. In the fire department 265 proposals have been accepted, assuring £210,332, and of which the annual premiums amounted to £378. 11s. 2d. One loss only has been sustained in this department, amounting to £1. 10s. 14 proposals for loans have been received and accepted, and the sum of £1,381. 10s. advanced. Of this, £383. 19s. 3d. has been repaid, and £1,007. 10s. 9d. is still outstanding. With a view to keeping the expenses within the lowest possible limit, the directors have deferred appropriating to themselves any remuneration for their services. The directors announce that the "preliminary expenses," including cost of deed, rent of premises, salaries of officers, printing, repairs, furniture, &c., did not exceed £803. 10s. 7d. A dividend of £5 per cent. upon the paid-up capital has been declared. Agencies of the highest respectability have been established in towns and districts, and efficient measures are being taken to extend them to all parts of the kingdom. The directors take this opportunity of acknowledging the untiring exertions of Mr. F. R. Jones on behalf of the Company.

In conclusion, the directors remind the shareholders that 11 months only have expired since the complete registration, hence the accounts have not been audited, and they are unable to present a balance-sheet to the meeting. They therefore earnestly request, that the meeting be adjourned to the first Wednesday in January next, when they will be prepared to lay a detailed statement of accounts before the share and policy holders.

In reply to a question respecting the compensation spoken of in the report, as having been deservedly earned by the promoters of the Company, the nature of which it would be the duty of the shareholders on a future occasion to name, the chairman intimated that it was usual in Companies of this nature to award compensation to those who had taken an active part in setting them on foot. The matter, however, would stand over until January. A director said, the sum proposed was very limited, certainly not more than £250.

*The London and Provincial Law Life Assurance Society (1845).—Sixth Annual General Meeting, held 14th of April, 1852.*—The balance-sheet for the year ending the 31st of December, 1851, with a report from the directors, was read and unanimously approved. It appeared that the income of the Society arising from dividends and interest on investments, and from the premiums on existing policies (averaging above £1,000 each, and assuring upwards of £433,000), amounted to nearly £18,000 per annum; and that the sum invested in Government and on real securities, with the cash in hand, after discharging all claims and demands to that day, was nearly £80,000. A statement recently issued explains that all the profits

should be accumulated for a period of 10 years, and that at the expiration of that time (viz., on the 31st of December, 1855) a division should be made of four fifths to the assured under policies (with profits) effected before the 31st of December, 1853, and of one fifth to the proprietors; thus forming a fund to answer any unforeseen calamity, and producing, over and above the paid-up capital, upwards of £40,000 in six years, and which, without any increase of business, must be more than trebled in the ensuing four years. All policies effected (with profits) before the 31st of December, 1853, will be entitled to participate in such division.

*London and Provincial Law Life Assurance Society.—Report to the Annual General Meeting, held April, 1853.*—The premiums on the new assurances effected during the last year amount to £3,009. 2s. 2d., which exceed the corresponding item of the previous year's balance-sheet by £834. 0s. 9d. It will be seen that there have been sales of considerable sums of stock, the directors having been enabled to invest the proceeds at an improved rate of interest. The average rate on the total funds of the Society is now about  $4\frac{1}{2}$  per cent. per annum. The investments on the 31st December, 1852, amounted at cost prices to £93,101. 18s. 8d., of which the sum of £15,675. 14s. has been invested in the course of the year. At the present prices of the funds, the Government securities are worth considerably more than the sums originally paid for them. In estimating the present capital of the Society, the shareholders will bear in mind that the paid-up capital amounted only to £36,948. The income of the Society during the past year was nearly £20,000. The whole expenses of management (including advertising, but exclusive of commission) were £1,912. 10s. 5d. It is satisfactory to be able to state that, notwithstanding a year's deterioration in the value of the lives insured, and the additional risks since undertaken, the claims paid during the last year did not exceed the sum paid in 1851, viz., £2,400.

*Receipts and Expenditure during the year ending 31st December, 1852.*

Dr.		£.	s.	d.	£.	s.	d.
To premiums on new assurances		3,009	2	2			
Ditto recurring ditto		13,791	12	2			
					16,800	14	4
Dividends and interests on investments					3,196	10	9
Considerations for annuities					529	5	5
Loans repaid		3,000	0	0			
Stock sold		10,505	13	6			
					13,505	13	
Commission on counter assurance					54	13	7
Considerations for surrendered policies of reinsurance					183	11	6
Balance from 31st December, 1851, viz.—							
At Bank of England		2,914	4	9			
In secretary's hands		109	4	2			
					3,023	8	11
					£37,293	13	0
Cr.		£.	s.	d.			
By rent			194	3	4		
Rates and taxes			79	9	2		
Insurance, coals, and painting of house			45	5	0		
Stationery and printing			50	14	3		
Advertisements			283	11	6		
					£653	3	3
Carried forward							

	£.	s.	d.
Brought forward . . . . .	653	3	3
Petty cash, including postage . . . . .	51	14	7
Direction, from April 14, 1851, to April 14, 1852 . . . . .	512	8	0
Auditors . . . . .	21	0	0
Salaries to actuary and secretary, physician, and clerks . . . . .	615	0	0
Receipt stamps for renewal premiums . . . . .	18	0	3
Law charges . . . . .	10	4	10
Commission . . . . .	808	18	4
Fees to medical referees . . . . .	30	19	6
Premiums on counter assurance (new) . . . . .	£92	17	6
Ditto ditto (renewals) . . . . .	922	8	2
	1,015	5	8
Annuities . . . . .	1,193	1	6
Claims under three policies . . . . .	2,400	0	0
Considerations for surrendered policies . . . . .	372	13	3
Premium returned . . . . .	2	5	0
Invested in Government and other securities . . . . .	28,481	7	6
Stamp (balance of 1851) . . . . .	0	5	0
Balance at the bank . . . . .	£1,038	8	0
Ditto draft returned . . . . .	13	13	4
Ditto in secretary's hands . . . . .	55	9	3
	1,107	11	4
	£37,293	18	0

The Society's investments on the 31st December, 1852, were—

£17,335	0	6	£3 per cent. Consols.
27,793	19	10	£3½ per cent. Annuities.
4,500	0	0	Great Western Railway debentures.
45,850	0	0	on mortgage, &c.

*London Indisputable Life Policy Company (1848).—Third General Meeting, held 13th June, 1851.*—The report states that at the date of the last annual meeting the Company had issued 631 policies, assuring the sum of £193,573. 16s., and yielding a revenue of £7,439. 12s. 2d.; and in the course of the last twelve months there have been received 439 proposals, for the assurance of £148,955. 6s. Of these proposals, 384 have been accepted and completed, assuring £110,205. 4s., and yielding in annual premiums £4,034. 8s. 7d.; making the number of policies issued within three years from the date of establishment of the Company, 1,015, assuring £303,779, and yielding a revenue of £11,483. 0s. 9d. The claims during the past year have been considerably less than half the calculated expectancy, and amounted only to £1,099. From the balance-sheet to 31st December last, it appears that after providing for the payment of the sums assured and outstanding debts, including the whole preliminary expenses attending the formation of the Company, there was a balance of £17,683. 6s. 6d., exclusively the property of and divisible amongst the members, as directed by the deed of constitution. It is stated also that the success of the Company has not arisen from loan or annuity transactions.

*London Indisputable Life Policy Company.—Annual General Meeting, held 9th June, 1852.*—The report stated, that at the date of the last annual meeting the Company had issued 1,015 policies, assuring the sum of £303,779; and in the course of the last twelve months there have been received 513 proposals, for the assurance of £186,907. 5s., of which 428 have been accepted and completed, assuring £127,812. 19s., and yielding in annual premiums £4,702. 3s. 9d., being a considerable increase over the business of the previous year, and making the number of policies issued

since the establishment of the Company 1,443, assuring £431,591. 19s. After deducting the policies that have become claims, those that have expired, and those that have dropped, there remain 1,184 policies, yielding an annual income of £13,796. 3s. 1d. The balance-sheet to 31st December last, containing a statement and valuation of the assets and liabilities of the Company, certified and audited in terms of the statute under which the Company is incorporated, was presented to the meeting; from which it appears, that after providing for the payment of the sums assured, and outstanding debts, including the whole preliminary expenses attending the formation of the Company, there was at that period a balance of £28,504. 10s. 1d., which will be applicable to the reduction of premiums as provided by the deed of constitution. The claims of last year amounted only to £1,742. 14s., making the total amount of claims from the commencement of the Company, £3,941. 14s. The premiums received upon expired and lapsed policies, which no longer continue obligations on the Company, have amounted to £1,703. 14s. †

*London Indisputable Life Policy Company.—Annual Meeting, held 11th June, 1853.*—The balance-sheet, and also a statement of the receipts and expenditure for the year 1852, and a statement and valuation of the assets and liabilities of the Company as at 31st December last, audited and certified, were presented to the meeting, from which it appears that after providing for the payment of every policy and every outstanding debt, including preliminary expenses attending the formation of the Company, the establishment of agencies, and every other expenditure, there was at that period a balance of £39,398. 0s. 1d. in favour of the Company. The difference between the value of current premiums and future claims is, of course, not yet realized; but a low rate of interest—only 3 per cent.—having been assumed as the basis of the calculation, and as the rate of mortality adopted has been found to be higher than the Company has experienced, and no part of the profit to arise from discontinued and surrendered policies has been included in the valuation, the estimate must be regarded as sufficiently low. The first declaration of profits (which belong exclusively to the assured) is by the deed of constitution appointed to be made at the annual general meeting of 1854, and will be applicable to those who shall have paid five annual premiums; thereafter the profits will be apportioned annually; and the board expect that the first reduction of premiums, to be declared at the next annual meeting, will exceed 25 per cent. In the year embraced in the accounts now presented, 570 proposals have been received, for the assurance of £177,628. 2s., of which 430 have been accepted and completed, being rather more than that of the preceding year, assuring £115,201. 12s. 6d., and yielding in annual premiums the sum of £4,263. 12s. 5d. The number of policies issued since the establishment of the Company up to the 1st instant has been 1831, and the total sum assured, £531,115. 1s. 6d.; after deducting the policies that have become claims, those that have expired, and those discontinued, there remain 1,347 policies, yielding an annual income of £15,262. 14s. 2d. The claims of last year amounted only to £2,550, making the total amount of the claims from the commencement of the Company £6,491. 14s., being much smaller in amount and fewer in number than the calculated expectancy. The premiums received upon expired and lapsed policies have amounted to £3,260. 16s. 4d.

*Receipts, from the 1st January to the 31st December, 1852.*

	£.	s.	d.
Balance at bankers, 31st December, 1851 . . . . .	1,431	6	10
Ditto in the hands of secretary . . . . .	16	1	5
Ditto ditto agents . . . . .	2,354	11	8
Premiums on life policies . . . . .	£4,263	12	5
Renewal premiums . . . . .	9,807	19	1
	14,071	11	6
Interest on loans to policy-holders . . . . .	318	16	5
Purchase of policies . . . . .	153	17	4
	£18,346	5	2

*Expenditure.*

	£.	s.	d.
Rent and taxes . . . . .	254	10	9
Printing and stationery, and advertising at head office, and for branches and agencies . . . . .	723	11	10
Directors and auditors for previous years, as stated in liabilities for 1851, and including £520 for year 1852 . . . . .	1,026	11	2
Management—salaries . . . . .	1,080	9	6
Solicitors for this year and previous years, as stated in liabilities for 1851 . . . . .	274	1	8
Messenger, postages, gratuities, and other incidental charges . . . . .	350	11	5
Agency charges, including inspector's salary, travelling expenses, and charges of West-end Branch . . . . .	638	8	8
Interest on advances from guarantee fund . . . . .	118	10	9
Furniture and repairs in office . . . . .	33	16	0
Stamps on hand . . . . .	22	11	0
Reassurance . . . . .	1,357	6	3
Commission . . . . .	728	1	0
Claims . . . . .	2,550	0	0
Medical fees . . . . .	403	1	0
Guarantee fund—repayment . . . . .	1,500	0	0
Loans to policy-holders, bearing interest at 5 per cent. . . . .	2,474	5	5
Exchequer bills . . . . .	1,047	2	6
Balance in the hands of agents . . . . .	2,697	0	3
Ditto ditto bankers . . . . .	1,037	7	3
Ditto ditto secretary . . . . .	8	18	9
	£18,346	5	2

*Liabilities.*

	£.	s.	d.
Present value of the sums under assurance at the 31st December, 1852 . . . . .	179,202	17	8
From guarantee fund . . . . .	1,000	0	0
Directors and manager, charged in expenditure . . . . .	1,401	0	10
Advertising . . . . .	£20	0	0
Printing and stationery . . . . .	400	0	0
Commissions not drawn . . . . .	52	9	10
Interest on advances . . . . .	25	0	0
	497	9	10
Balance . . . . .	39,398	0	1
	£221,506	8	5

*Assets.*

	£.	s.	d.
Present value of the premiums payable for policies current at the 31st December, 1852 . . . . .	209,232	0	2
Loans to policy-holders, at 5 per cent. interest . . . . .	6,761	8	6
Value of furniture . . . . .	150	0	0
Lease of premises . . . . .	550	0	0
Balance in hands of agents . . . . .	2,697	0	3
Ditto ditto bankers . . . . .	1,037	7	3
Ditto ditto secretary . . . . .	8	18	9
Stamps on hand . . . . .	22	11	0
Exchequer bills . . . . .	1,047	2	6
	£221,506	8	5



*London Life Association (1806).—Special Meeting, January, 1851.*  
—A report from the directors was read, from which it appeared that under the deed of settlement a certain day (1st July) is fixed for commencing policies and dividing profits, and that seven such anniversaries must have passed before the assured becomes entitled to any share of the profits in the shape of reduction of annual premium. The effect of this is, that while some become entitled to share after seven annual payments, eight payments become necessary in the case of others. To obviate this injustice, the directors propose to reckon from the actual day of entry, and to allow the assured to enter into share of profits after seven annual payments. The resolutions to that effect were unanimously agreed to.

*London Life Association.—Half-yearly General Meeting, held January, 1852.*—The auditors' report exhibited the following results for the half year, to the 31st of December last:—

	£.	s.	d.
Balance in hand, July . . . . .	21,420	1	9
<i>Receipts.</i>			
Dividend and interest on capital invested . . . . .	51,009	2	4
Premiums on assurances, after deducting 69 per cent. to those members entitled thereto . . . . .	78,073	7	5
Premiums on other assurances . . . . .	7,505	7	9
Policy stamps, fines, &c. . . . .	336	7	6
Extra premiums . . . . .	423	1	0
Discount on assurances paid . . . . .	17	5	2
Repayment of money advances on mortgages, &c. . . . .	55,263	16	9

Total . . . . . £214,048 9 8

The surplus profits being applied every year in reduction of annual premiums.

	£.	s.	d.
<i>Payments.</i>			
Claims on policies and purchase of policies . . . . .	50,649	8	6
Office expenses and special payments . . . . .	5,214	5	4
Advances on mortgages and policies . . . . .	105,000	0	0
Loan on stock and exchequer bills . . . . .	45,000	0	0
Balance in hand, 31st December . . . . .	7,684	15	4

£214,048 9 8

	£.	s.	d.
<i>Capital in hand.</i>			
Funded property, mortgages, annuities, &c., to amount of . . . . .	2,374,922	15	8
Yielding annual dividend of . . . . .	99,351	19	5
Besides amount of gross annual premiums on 4,846 existing policies . . . . .	207,473	1	4
Balance in hand . . . . .	£7,684	15	4
Interest due on mortgages . . . . .	8,215	5	10
Value of house, fixtures, &c. . . . .	16,414	0	0

32,314 1 2

The chairman proposed a resolution to pay a policy for £1,000 in full; it had been effected in 1826, and was forfeited through the suicide of the assured, a Mr. H. Smith. Also a resolution to pay the full Office value on a policy for £2,000 on the life of Mr. M. Ledger, who had gone from Van Diemen's Land to California, refusing to pay this Company the extra rate on such change of residence.

These resolutions were then formally put and carried.

The chairman then explained that the directors asked for powers to pay upon all policies void by suicide, or other cause, without the delay of coming to the half-yearly meetings to sanction the payment of such policies.

The resolution was seconded by Mr. Kaye, and carried unanimously.

*London Life Association.—Half-yearly General Court, held July, 1852.—Receipts and Payments for the half year ending June 30, 1852.*

	£.	s.	d.
To balance in hand 1st January, 1852 . . . . .	7,684	15	4
<i>Receipts.</i>			
Dividends on £120,000 Consolidated 3 per cent. Annuities . . . . .	1,800	0	0
" £11,800 Reduced 3 per cent. Annuities . . . . .	177	0	0
" £150,000 3¼ per cent. Annuities . . . . .	2,437	10	0
" £80,000 Bank stock . . . . .	3,200	0	0
" £40,000 South Sea stock . . . . .	700	0	0
" £100,000 Canada debentures . . . . .	2,000	0	0
" £9,000 Government annuities for terms of years . . . . .	4,500	0	0
Interest on money advanced on mortgage and policies . . . . .	40,352	14	5
Policy stamps, fines for non-appearance, and for renewal of policies . . . . .	305	13	9
Premiums on assurances of members, after allowing 70 per cent. reduction to those entitled thereto . . . . .	12,575	17	6
Premiums on assurances of members effected since 31st December last . . . . .	4,050	8	0
Premiums on assurances of persons not members . . . . .	3,922	1	4
Extra premiums . . . . .	383	4	7
Repayment of money advanced on mortgage and policies . . . . .	25,225	19	9
Discount on assurances paid . . . . .	25	12	10
Sale of £15,000 Consolidated 3 per cent. Annuities . . . . .	14,850	0	0
Loan on exchequer bills repaid, and interest . . . . .	30,278	12	8
	£154,469	10	2

	£.	s.	d.
<i>Payments.</i>			
In discharge of claims on policies . . . . .	55,100	0	0
Purchase of policies . . . . .	9,204	19	7
Advanced on mortgage . . . . .	52,700	0	0
Ditto on policies of the Association . . . . .	11,930	0	0
Fees to directors and auditors . . . . .	1,093	1	0
Salaries to officers of the establishment, and medical officers . . . . .	917	10	0
Pension to Mr. Brooke . . . . .	£250		
Ditto to Mr. Rainbow . . . . .	150		
	400	0	0
Receipt stamps . . . . .	108	1	0
Ground rent, law expenses, parochial rates, stationery, &c. . . . .	450	9	3
Income tax . . . . .	1,609	18	8
Advanced for stamps on policies . . . . .	237	14	0
Balance, 30th June, as per cash book . . . . .	20,717	16	8
	£154,469	10	2

*Funded Property and other Assets on the 30th June, 1852, and the income arising therefrom.*

	Property.	Income.
Consolidated 3 per cent. Annuities . . . . .	£105,000 0 0	£ 3,150 0 0
Reduced 3 per cent. Annuities . . . . .	11,800 0 0	354 0 0
Three-and-a-quarter per cent. Annuities . . . . .	150,000 0 0	4,875 0 0
Bank stock . . . . .	80,000 0 0	6,000 0 0
South Sea stock . . . . .	40,000 0 0	1,400 0 0
Canada debentures . . . . .	100,000 0 0	4,000 0 0
Advanced on mortgage and policies . . . . .	1,819,526 15 11	77,556 14 8
Government annuities for terms of years . . . . .	9,000 0 0	2,312 0 0
Deduct for reinvestment on account of principal . . . . .	6,688 0 0	
Balance of cash in hand on 30th June last . . . . .	20,717 16 8	
Interest due on mortgage advances and policies . . . . .	6,721 0 9	
House, furniture, fixtures, &c., in King William Street . . . . .	16,414 0 0	
Annual dividends and interest on mortgages . . . . .		99,647 14 8
Gross amount of annual premiums on 4,880 existing policies . . . . .		208,935 4 2
		£308,582 18 10

General Statement of the Affairs, up to the 30th June, 1852.

Dr.	£.	s.	d.
The present value of £5,805,272 assured on the lives of members	3,074,462	0	0
The present value of £200,789 assured on lives not as members	104,032	0	0
The present value of a pension of £500 per annum to Mr. Brooke	1,964	0	0
The present value of a pension of £300 per annum to Mr. Rainbow	1,536	0	0
Reserve for value of policies for short terms	244	0	0
Claims ascertained but not yet paid	39,541	0	0
Reserve for additional claims to June 30, 1852	77,631	0	0
Reserve for salaries, fees, and current expenses payable before 1st July, 1852	1,300	0	0
	<u>£3,300,710</u>	0	0

Cr.	£.	s.	d.
Capital invested—			
In £116,800 3 per Cent. stock			
£150,000 3½ per Cent. stock			
£40,000 3½ per Cent. stock			
£80,000 Bank stock			
Canada debentures	102,235		
Annuities for terms of years	46,244		
Mortgage and policies	1,822,540		
House, furniture, fixtures, &c., in King William Street	16,414		
Policy and mortgage stamps in hand	444		
Balance—Bank of England	£10,497		
Messrs. Hankey	2,862		
	<u>13,359</u>		
Various sums due and payable to the Society before the 1st of July, 1852	2,361,453	0	0
The present value of £5,989, being the amount of annual premiums on assurances not as members	63,503	0	0
The present value of £44,554, being the amount of annual premiums which the members not yet entitled to reduction will have to pay in full	155,384	0	0
The present value of £202,173, being the whole amount of annual premiums on the lives of members	£2,399,134		
Deduct present value of the amount to be paid in full as above	155,384		
	<u>2,243,750</u>		
The present value of the amount subject to reduction	1,570,625		
Seventy per cent. reduction thereon			
	<u>673,125</u>	0	0
	<u>£3,300,710</u>	0	0

Income.	£.
£116,800 3 per Cent. stock, producing yearly	3,504
£150,000 3½ ditto	4,875
£40,000 3½ ditto	1,400
£80,000 Bank stock	6,000
£100,000 Canada debentures	4,000
Government annuities for terms of years	£9,000
Deduct for reinvestment on account of principal	6,688
	<u>2,312</u>
£1,822,540 advanced on mortgage and policies	77,717
	<u>£99,808</u>

*London Life Association.—Report of the Receipts and Payments for the half year ending the 31st December, 1852.*

	£.	s.	d.
To balance in hand 1st July, 1852 . . . . .	20,717	16	8
<i>Receipts.</i>			
Dividends on £105,000 Consolidated 3 per cent. Annuities . . . . .	1,575	0	0
" £11,800 Reduced 3 per cent. Annuities . . . . .	177	0	0
" £150,000 3½ per cent. Annuities . . . . .	2,437	10	0
" £80,000 Bank stock . . . . .	2,800	0	0
" £40,000 South Sea stock . . . . .	700	0	0
" £100,000 Canada debentures . . . . .	2,000	0	0
" £9,000 Government annuities for terms of years . . . . .	4,500	0	0
Interest on money advanced on mortgage and policies . . . . .	37,803	19	9
Policy stamps, fines for non-appearance and for renewal of policies . . . . .	294	0	0
Premiums on assurances of members, after allowing 70 per cent. reduction to those entitled thereto . . . . .	75,964	11	5
Premiums on assurances of members effected since June last . . . . .	3,618	18	3
Premiums on assurances of persons not members . . . . .	2,587	11	10
Extra premiums . . . . .	253	14	1
Repayment of money advanced on mortgage and policies . . . . .	72,349	7	10
Discount on assurances paid . . . . .	19	15	8
Sale of £120,000 Consolidated 3 per cent. Annuities . . . . .	120,000	0	0
Sale of £10,000 Bank stock . . . . .	22,286	18	0
	£370,086	3	6
<i>Payments.</i>			
In discharge of claims on policies . . . . .	54,690	0	0
Purchase of policies . . . . .	4,766	19	8
Advanced on mortgage . . . . .	65,300	0	0
Ditto on policies of the Association . . . . .	13,465	0	0
Fees to directors and auditors . . . . .	1,104	12	0
Salaries to officers of the establishment and medical officers . . . . .	1,045	0	0
Pension to Mr. Brooke, £250; ditto to Mr. Rainbow, £150 . . . . .	400	0	0
Receipt stamps . . . . .	23	2	6
Ground rent, law expenses, parochial rates, stationery, &c. . . . .	776	16	9
Income tax . . . . .	1,434	11	6
Advanced for stamps on policies . . . . .	160	5	0
Return of extra premium, premium paid in error, and fine . . . . .	160	16	0
Purchase of £80,000 Consolidated 3 per cent. Annuities . . . . .	80,400	0	0
Balance, 31st December, as per cash book . . . . .	146,359	0	1
	£370,086	3	6

*Funded Property and other Assets, on the 31st December, 1852, and the Income arising therefrom.*

	Property.			Income.		
	£.	s.	d.	£.	s.	d.
Consolidated 3 per cent. Annuities . . . . .	65,000	0	0	1,950	0	0
Reduced 3 per cent. Annuities . . . . .	11,800	0	0	354	0	0
Three-and-a-quarter per cent. Annuities . . . . .	150,000	0	0	4,875	0	0
Bank stock . . . . .	70,000	0	0	4,900	0	0
South Sea stock . . . . .	40,000	0	0	1,400	0	0
Canada debentures . . . . .	100,000	0	0	4,000	0	0
Advanced on mortgages and policies . . . . .	1,825,942	8	1	77,982	16	10
Government annuities for terms of years . . . . .	9,000	0	0	2,152	0	0
Deduct for reinvestment on account of principal . . . . .	6,848	0	0			
Balance of cash in hand on 31st December last . . . . .	146,359	0	1			
Interest due on money advanced on mortgage and policies . . . . .	7,988	13	10			
House, furniture, fixtures, &c., in King William Street . . . . .	16,299	0	0			
Annual dividends and interest on mortgages . . . . .				97,613	16	10
Gross amount of annual premiums on 4,697 existing policies . . . . .				209,439	18	4
				£307,053	15	2

*London Monetary Advance and Life Assurance Company (1851).—Report and Balance Sheet read at the Fourth Half-yearly Meeting, held 8th August, 1853.*—The directors feel justified in recommending an increase of the rate of dividend from £5 to £6 per cent.

The certificate of the auditors to this effect provides as usual for the payment of every liability, together with the customary instalment of £50 in reduction of the preliminary expense account. The balance then remaining leaves a considerable surplus to be carried to the reserved fund, after setting aside for the remuneration of the directors the proportion of the yearly allowance for that purpose.

The shareholders are aware that it has been the endeavour to reduce the probability of loss to as narrow a chance as possible; and with the view of extending the application of this principle—so prudent in the case of young Associations of this kind, that have frequently been seriously crippled in their progress by an untoward fall of lives—the directors have to invite the sanction of the shareholders to an arrangement by which they propose to relieve the Company from this anxiety altogether, by transferring to another Institution the ultimate responsibility of that department of the Company's business connected with the contingencies of life.

*Balance Sheet for the half year ending June 30, 1853.*

<i>Liabilities.</i>		£.	s.	d.
To capital, per deed, as under; viz:—				
2,216 shares issued at £5 per share . . . . .	£11,080	0	0	
3,784 shares for issue . . . . .	18,920	0	0	
		30,000	0	0
Temporary advance, made by directors, to extend the profitable operations of the Company . . . . .		500	0	0
Debtenture capital secured on the Company's bonds, bearing interest at 5 per cent. per annum . . . . .		1,160	0	0
Amounts unpaid at this date; viz:—				
Sundry accounts . . . . .	£147	19	6	
Unclaimed dividends . . . . .	14	11	2	
Interest due to bondholders to 30th June . . . . .	15	3	8	
		177	14	4
Amount of reserve fund, being surplus profit after paying dividend to December 30th, 1852, and reducing the preliminary expenses £150		150	6	0
Balance of profit and loss. Net amount of profit realized for the half year ending the 30th June, 1853 . . . . .		635	16	0
		£32,623	16	4
<i>Assets.</i>		£.	s.	d.
By loan in course of repayment . . . . .		7,130	10	2
Cash balance; viz., at London and Westminster Bank . . . . .	£246	3	10	
In secretary's hands . . . . .	5	10	2	
		251	14	0
Office fittings and furniture . . . . .		426	10	0
Preliminary expenses:—				
Amount expended in establishing the Company; viz., law expenses, including cost of deed of incorporation	387	9	7	
Advertising, salaries, printing and stationery, rent and taxes, commission, &c. . . . .	944	16	6	
	£1,332	6	1	
Deduct amount of reduction to 31st Dec., 1852, being at the rate of £100 per annum, in accordance with a resolution of the proprietors passed at the first half-yearly meeting of the Company . . . . .	150	0	0	
		1,182	6	1
Carried forward . . . . .		£8,991	0	3

		£.	s.	d.
	Brought forward . . . . .	8,991	0	3
Interest due on loans in course of repayment . . . . .		50	0	0
By capital per contra; viz.:—				
Amount unpaid on shares subscribed for . . . . .	£4,662 16 1			
Shares for issue . . . . .	18,920 0 0			
	<hr/>	23,582	16	1
		<hr/>	£32,623	16 4

*London Mutual Life and Guarantee Society (1848).—General Meeting of the Proprietors, held June, 1851.*—The report stated that the certificate of complete registration was obtained from the Registrar-General on the 31st day of October, 1849, and the business was begun. The first policy was issued on the 11th day of December in that year; and between that day and the 31st December last, a period of little more than twelve months, 862 policies were issued by the Society, assuring the sum of £144,854. The total number of proposals for assurance during the same period was 1,035, for a sum of £247,904; of these 68 were declined, on the report of the medical officers or for other sufficient reasons, for a sum of £18,075; 282 were accepted, but have not been completed by the proposers, for a sum of £76,430; 82 were completed, but have since lapsed to the Society, a sum of £373. 4s. 7d. having been paid upon them; and the 780 remaining, for the sum of £133,441, are now in full force.

Of the policies thus issued, 739 are for an assurance for the whole period of life, with a participation in the profits; 15 are for an assurance for the whole period of life, by a defined number of payments; 113 are to assure a sum of money at a given age or death, for deferred annuity or endowments; and 19 are for an assurance on the life in combination with a guarantee for fidelity.

Although, from the amount of business done, the expectation of death among the number of lives actually assured to the present time might amount to 7 in number, the actual mortality has been only 2, of the respective amounts of £100 and £200. No less than 38 of the policies issued as above mentioned are for sums not exceeding £50, and 270 for sums not exceeding £100. The average age of the lives assured is 33½ years, and the average sum for which the assurances are effected on each life is £219. 10s. 6d.

Those provisions of the deed which relate to the granting of loans, and to the allowance of interest on deposits, have also furnished the Society with some business, the sum of £2,680 having been advanced to 24 borrowers up to the 31st December last; nor has any loss happened to the Society in this branch of its operations. Three depositors have lodged with the Society the sum of £450, upon which the interest has been regularly paid.

*Statement of Receipts and Expenditure, from 27th June, 1849, to 31st December, 1850.*

	Receipts.	£.	s.	d.
Temporary capital fund—deposit and first call on 5,000 shares, at £1 per share . . . . .		5,000	0	0
Assurance premium fund—				
Life premiums, single lives, whole term . . . . .	£3,536 7 6			
Ditto ditto, limited number of payments . . . . .	115 1 1			
Ditto ditto, joint lives . . . . .	33 7 8			
	<hr/>	£3,684	16	3
Carried forward . . . . .				

# *Reports of Assurance Companies.*

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	£.	s.	d.	£.	s.	d.
Brought forward . . . . .	3,684	16	3			
Life premiums, survivorship . . . . .	18	0	6			
Ditto ditto, for terms of years . . . . .	30	11	2			
Endowments, with temporary assurance . . . . .	245	1	9			
Endowments, premiums returnable . . . . .	162	6	9			
Ditto, ditto non returnable . . . . .	110	15	10			
Deferred annuity, premiums returnable . . . . .	16	15	10			
Ditto, ditto non returnable . . . . .	4	15	11			
Life premiums combined with guarantee . . . . .	118	9	11			
Guarantee premiums combined with life assurance . . . . .	42	18	0			
				4,434	11	5
Stamp duties on loan securities . . . . .	34	13	0			
Fees on transfer certificates . . . . .	0	2	0			
Deposits on forfeited shares . . . . .	1	15	0			
				36	10	0
Deposit account, amount deposited at interest by sundry depositors . . . . .				374	8	3
Interest on India bonds . . . . .	64	16	9			
On loans . . . . .	77	15	8			
On discount on policy stamps . . . . .	4	19	0			
				147	11	5
Agents, for balances due for commission, &c., as per schedule . . . . .				99	19	8
T. Spencer, Rochdale, amount remitted by him in error at his credit . . . . .	1	5	0			
Tradesmen's bills unpaid, included in charges per contra . . . . .	62	14	7			
Income tax, amount deducted from interest due to shareholders . . . . .	18	19	4			
Interest on temporary capital fund due to shareholders in course of payment (less income tax) . . . . .	631	4	2			
Interest on deposit unpaid (Mr. T. H. Tarlton) . . . . .	0	8	3			
Directors' attendance fees standing at their credit . . . . .	620	11	0			
				1,335	2	4
				£11,428	3	1
<i>Expenditure.</i>						
Law charges—For preparation of deed of settlement, registration under Act, solicitors' attendances at board, agreement for occupation of offices, &c. . . . .	£	s.	d.			
Reassurance . . . . .	327	9	11			
For current interest on India bonds at time of purchase . . . . .	107	5	9			
Interest on temporary capital fund payable to shareholders . . . . .	£16	4	8			
Interest paid to depositors . . . . .	650	3	6			
	10	18	8			
				677	6	10
Fees paid at Joint Stock Companies Registration Office in lodging returns under Act of Parliament . . . . .				14	4	0
Agency deductions—						
Commission . . . . .	£291	19	9			
Less commission on reassurances . . . . .	10	13	2			
Charges for petty disbursements . . . . .	22	16	7			
Superintendent of agencies' salary . . . . .	39	0	0			
Ditto travelling expenses . . . . .	60	19	11			
				404	3	1
Medical fees, town and country, and London medical officers . . . . .				605	15	9
General establishment charges—						
Office expenses, coals, gas, housekeeper, &c. . . . .	35	13	3			
Rent and insurance, 5½ quarters . . . . .	331	8	6			
Salaries—secretary, accountant, and clerks, messenger's wages and livery, and extra clerks . . . . .	836	3	11			
Advertisements . . . . .	336	16	5			
Printing, account books, office books, official forms, and stationery . . . . .	1,085	3	1			
Postages and parcels . . . . .	575	5	2			
Petty and miscellaneous expenses . . . . .	22	0	5			
				3,222	10	9
Carried forward . . . . .				£5,358	16	1

	£.	s.	d.
Brought forward . . . . .	5,358	16	1
Stamps—policy stamps on policies issued . . . . .	£347	2	6
Receipt stamps for renewals . . . . .	2	0	0
		349	2 6
Directors' attendance fees . . . . .		620	11 0
Office furniture and fittings . . . . .	543	17	8
Premiums due on policies, included in premium account, &c. . . . .	9	19	1
Investments—			
In public funds, £1,000 India bonds, cost . . . . .	1,042	15	0
Loans to members, balance as per schedule . . . . .	2,144	15	1
Agents, balance in hands of, as per schedule . . . . .	93	15	1
Policy stamps in hand . . . . .	46	5	0
Balance at bankers . . . . .	1,206	14	4
Cash in office . . . . .	11	12	3
		5,099	13 6
		£11,428	3 1

The chairman said it was his duty to read to them an account of the business of the Society up to the 28th of June. The policies issued were 1,146, and the sums assured thereby £186,100. The proposals received were 1,318, and the sums assured £307,560. The proposals declined were 91, amounting to £23,625. There had been accepted, but not completed, 338, for £89,930; and there were under consideration 27, amounting to £5,850. There were policies lapsed, 198, assuring £28,730, the annual premiums represented thereby being £876. 16s. 4d. The policies remaining in force were 948, assuring £157,300, the annual income from which was £5,033. 12s. 10d. Of the policies issued, 970 were for the whole of life, with profits, 16 ditto by a limited number of payments, 89 were for a sum payable at a given age or death under that age, 47 were endowments, 13 for deferred annuities, 24 for life assurance and guarantee combined, 60 lives were assured for sums not exceeding £50, 341 for sums not exceeding £100. 271 agents had sent business; £4,116 had been lent to 33 members; 5 depositors had deposited £547. 16s. The average age of those assuring was 33½ years, and the average amount per policy was £247. After testifying to the zeal and ability of the agents of the Society, he observed that the income of the Society had sufficed to pay all their preliminary and current expenses (about £1,000), and other expenses amounting to £796.

It was resolved that for the future the fees of the chairman should be a guinea and a half for attendance at the board, and a guinea to each of the directors, and half such amounts for attendances at committees; and that the fees now standing at their credit be paid.



THE  
ASSURANCE MAGAZINE,  
AND JOURNAL OF  
THE INSTITUTE OF ACTUARIES.

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*Account of a Correspondence between Mr. George Barrett and  
Mr. Francis Baily. By PROFESSOR DE MORGAN.*

IN looking over some papers of the late Francis Baily, at the request of his sister, for the purpose of advising on their disposal, I found in one packet a number of letters addressed to him by the late George Barrett, the inventor (in this country) of the method for calculating life contingencies which now goes by his name. I also found the manuscripts of Baily's three works—on leases, on interest, and on life assurances: these are now in their proper place, the library of the Institute of Actuaries.

From Baily's methodical habit of arranging his papers, I feel confident that the letters alluded to are all which he received from Barrett: unless, indeed, some passed which he preferred not to preserve. The interest with which actuaries look upon the method *published*\* in these letters makes me think it desirable to give some account of them in a work which all actuaries consult.

I have also been able to obtain† some information as to Barrett's life.

\* I here use the word in its old and strict sense. Persons who have dipped into the history of discovery have often seen the *rule of first publication* cited as *Waring's rule*; and sometimes publication is limited, upon Waring's authority, to circulation by the press. But Waring's words are—"Is mihi semper dicendus est inventor, qui primus evulgavit, vel saltem cum amicis communicavit." Of course I do not acknowledge any authority here: I only meet those who do.

† For this I applied to Colonel Wyndham, the possessor of Petworth House, who obligingly introduced me to the Rev. John Peachy, the husband of Barrett's niece. To Mr. and Mrs. Peachy I am indebted for nearly all the biographical facts, construction and comment being of course my own.

George Barrett was the second son of a respectable farmer or yeoman, who lived at Wheeler Street, a small hamlet in the parish of Witley, Surrey. He was born about 1752. At an early age he was possessed by a great love of calculation, and spent all the money he could get on books of arithmetic, algebra, &c. It is said that, when a boy, he was one day met by the Vicar of his parish, who was in difficulty about some matter of calculation, but was extricated by his young parishioner, who levelled the sand near him with his hand, and worked out the question on it with perfect accuracy. Finding that he could not commit his thoughts to paper with facility, he persuaded his father to send him for a short time to a school in the neighbouring town of Godalming, to improve his handwriting. When he had been there a very short time, his master said to him one day, "Would you not like to learn a little ciphering, George? I would not give up all my time merely to learn writing." George did not seem at all desirous of profiting by the offered assistance, but consented, on the offer being repeated. Sums were given him from simple addition upwards, until the ability of the master was exhausted. "And now, Sir," said the boy, "will you give me leave to set you a sum?"—"Oh, yes, George, by all means." This was done, and the master acknowledged that he could not work it; adding, "If I were you, George, I would take off that round frock, and apply my mind to a more suitable occupation."

It is also said of him, that at 17 years of age, while sitting under a tree, he "discovered the distance of the earth from the sun"—meaning, no doubt, that he thought of some *method* for doing this. A modification of the steam engine (in which he afterwards found he was not original) is attributed to him; and the telegraph was an idea of his, derived without knowledge of any other inventor, if indeed any other inventor had preceded him. On this subject he communicated with the Government, and had reason given to expect employment, if any telegraph should be brought into use. Here he was disappointed; and his own suspicion was, that his revelations to another person had enabled that person to pass for an inventor. This is a matter which of course I cannot enter upon; I only mention it because his communication with those in power explains how it was that he afterwards went to Dublin for a short time on some Government employment, of the nature of which no details are preserved. Shortly after this, the late Earl of Egremont offered Barrett a situation in his household at Petworth; the date of this appointment is not exactly known,

but he is supposed to have been in the Earl's service in 1801. From the correspondence with Baily, he seems to have been a steward, bailiff, or managing agent of some kind—at least in 1811. Of this correspondence, and its object, I shall presently have to speak.

After his name had been made known to actuaries by Baily's *Appendix*, in September, 1813, he was appointed actuary to the Hope Assurance Office; but was informed—I think about December, 1815—that his services were no longer required. A letter to the directors, of the last date (which, however, does not explain anything sufficiently), imputes their “late determination,” which I suppose to mean the dismissal, to some dissatisfaction at the rate with which certain calculations were proceeding.

He retired to his sister's house at Godalming, worn out in mind and body, a martyr to the gout, and feeling deeply the failure of his attempts to publish his Life Annuity Tables. He died April 21, 1821, after months of extreme suffering, and was buried in Witley churchyard. He was during a great part of his life a frequent invalid, from gout and other disorders.

Barrett was by nature a *calculator*, and subject to the absence of mind which often accompanies *numerical* thought. He scarcely took a meal without marking figures with his finger on the table. He was known occasionally to forget to sign his name to his own letter; and this circumstance, in the neighbourhood, was considered as a sufficient identification of the writer. Though a man of strong feelings of affection, he was never married. His conduct towards his relatives was marked by the truly paternal kindness with which he treated the orphan children of one of his brothers. Nor was this all. His father had made his will before the two youngest children were born, and had not time, in his last illness, to make any codicil in their favour. But his son George promised that he himself would give to those children the same sums which had been left to the daughters; and this promise was fully kept, though it obliged him to sell the small property to which he had succeeded.

The mass of tables of which I shall presently speak were bought, a few years after Barrett's death, by Mr. Babbage, in whose possession they now are. They were constructed by Barrett himself up to the transfer of the products, found by logarithms, into numbers: in the additions and transcriptions he was assisted by his sister and niece, and (for a short time) by another niece and two nephews; and by no other persons. It was the earnest

desire of his family that he should write a treatise on his own method, but this his infirmities prevented. Some time after his death, most of his papers were accidentally destroyed by fire.

He never learned either French or German; but as he at one time kept a school, his friends suppose he had some knowledge of Greek and Latin. This seems to me not at all probable, his early education and subsequent pursuits being remembered; nor can any trace of such knowledge be detected in his letters. His books, so far as I have had their titles named, were English. The copies of a pamphlet which he once printed on the state of the police, were lost with his papers. He wrote occasionally, it is thought, in newspapers, under the signature G. B.: copies of letters to the editor of the *St. James's Chronicle* (one of August, 1783) have been found among his papers. His peculiar talent was never of any permanent use to him in a pecuniary point of view; and it seemed as if, to use his own words, "Thou shalt not prosper" was written on all his undertakings.

The mass of tables now in the possession of Mr. Babbage (including one of *Three Joint Lives*) was principally constructed between 1801 and 1813. During the greater part of this period a certain number of papers were sent weekly by Barrett from Petworth to Godalming, for his niece (who gave four hours a day, on the average) to work on, and for his sister to examine, previously to the whole receiving the final revision from himself.

Barrett's first communication to Baily is dated March 10, 1811. Referring to the *Treatise on Life Annuities*, then recently published, he expresses a desire for more numerical solution, and thinks it possible that Baily was deterred by want of sufficient extent of tables. He then states that for some years he has had ready for press an extensive set of tables, but doubts whether they can be published except by subscription. He gives a list of these tables, as follows:—

I. Sweden expectation of Two Joint Lives, for all differences of age.

II. For easily finding the expectation of One, Two, Three, or Four Joint Lives, from De Moivre's hypothesis, "the utmost extent of life may be taken as high as you please, not exceeding 96."

III. Four per cent. Male Single Life Annuity Tables.

IV. Ditto Female.

V. Sweden Single Life Annuity, at 2,  $2\frac{1}{2}$ , 3,  $3\frac{1}{2}$ , up to 10 per cent. "The last three tables will also show the value of an annuity, during any given life, of £1 payable at the end of the first year, £2 at the end of the second year . . ."

VI. Four per cent. Joint Life (one male and one female) Annuity Table, for all ages; also showing the increasing annuity.

VII. Sweden Joint Life Annuity Table, for all ages, at 3, 4, 5, and 6 per cent. Mr. Dutens (the well known editor of Leibnitz, and writer on the discoveries of the ancients) sent a part of this table to Baron Maseres, which accidentally never came to hand, so that a duplicate\* was sent. "However, this untoward circumstance will be a precaution not to trust in future any of my papers in the hands of gentlemen, let them be ever so respectable."

VIII. One, Two, Three, and Four Joint Lives, from De Moivre's hypothesis, at 2,  $2\frac{1}{2}$ , 3, up to 10 per cent. "The Four Joint Lives might have been excluded as useless, but are retained to exemplify more fully the method of calculation. By this table I can find the value of an annuity on the joint lives in a few minutes, either for terms or the whole duration of the lives."

IX. Four per cent. [Swedish] Table on Three Joint Lives. "This table will be comprised in 672 pages quarto . . . Mr. Morgan has expressed an opinion that a work to that extent would never be accomplished from a table of real observation." "N. B. All the above tables show the value of the annuities, whether they be temporary, deferred, or for the whole duration of the lives, and at any difference of age; and therefore you well know that the labour in constructing them must have been immense. The above is all I mean to say to you on the subject at present; if you should be of opinion that the tables will be of public utility and the calculations to be depended on, you will be so good as to communicate your sentiments on the subject . . . I take this opportunity of informing you that your rule for approximating to the value of  $\rho$  (see note A, p. 122, line 3) in your *Annuities*, will be greatly improved by substituting for  $\frac{s}{a}$  (at the end of the denominator) the amount of £1 *per annum* for  $n$  years, at the assumed rate. Put therefore 79.05818622 for 80 in the example below, which is my method of approximation."

When it is considered that Barrett does not hint at any novelty of method, and that he implies that his table *shows* all annuities,

\* Baron Maseres laid the scientific world under many obligations by his reprints, and by his assistance to authors who could not afford to print for themselves. It is a great pity that he did not patronise Barrett. The *Scriptores Logarithmici* has been very useful; but matter amounting to two volumes out of the six might easily be spared, and those two volumes form a bulk which would have contained Barrett's tables, even up to Three Joint Lives, for one rate of interest at least. I confess that I sometimes look into the mouths of the Baron's gift horses.

temporary and deferred, on every combination of *three* joint lives, the readers of this article will certainly give Baily credit for great politeness or great sagacity, when they are told that he replied by expressing his willingness to promote the subscription, adding some remarks on the desirableness of abandoning De Moivre's hypothesis in favour of real observations. I suspect that at this time the prominent idea in Barrett's mind was, not the method itself, its goodness, and its novelty, but the vast mass of tables which it had enabled him to construct: his expressions show that he thought more of his work than his tool. It is one more instance added to the hundreds which I have noticed, of the difficulty which the isolated and self-taught man has in taking his subject from more than one point of view.

In his second letter (April 28, 1811), after acknowledgments and some remark on De Moivre's method, he proceeds thus:—"I must now beg leave to inform you that my tables are constructed in a way different from any I have before seen; had that not been the case, I verily believe the public would have always been in want of a table of three joint lives for all ages, and therefore this must be my apology for adopting a method different from all others; and I hope it will prove to you satisfactory. If any will object to it, let them try their skill, or rather their patience, in producing tables equally comprehensive, that may be found more consonant to their wishes: I shall certainly have no objection. I am fearful I was a little unguarded in my expressions when I said '*tables showing*,' &c., when it would have been more appropriate to have said, '*tables for finding, or determining*, &c.' For the value of an annuity *deferred*, or for the *whole of the same life*, is expressed in my tables by vulgar fractions having each the same denominator, and therefore a division is requisite to reduce them to a decimal form: they therefore cannot strictly be said to *show* those values, by inspection, *decimally*; but they show the values of the annuities, whether for the whole life or when deferred, by a *vulgar fraction*, and consequently, to find the value of a temporary annuity, one subtraction and a division will be necessary; and as to *increasing* annuities, the values thereof, whether temporary, deferred, or for the whole duration of the lives, will be determined in like manner."

Baily has marked the difference of the footing on which his correspondent now came before him, by preserving a copy of his answer (May 4, 1811). The following is an extract:—"You observe that your tables are constructed in a very different manner from any others; and I confess I cannot make out, from anything

you have stated, the method which you have adopted on this occasion. I make no doubt, from your knowledge of the subject, that they are properly constructed, and are very probably rendered as convenient as the present state of the science will admit. Nevertheless, as their form certainly varies from any yet in use, and as their principle of construction may admit of some additional examination, I do not think I am properly qualified at present to give a decided opinion on their merits or demerits. If, however, you are willing to send me a specimen of each of your tables, together with the principles of their construction, I shall very readily examine them, and will give you my free opinion on their advantages and utility; and should that opinion (which I anticipate) be confirmed, I shall be happy in promoting the plan which you have adopted for publishing them."

Barrett replies (May 7) by requesting leave to wait on Baily with his papers. This interview seems to have taken place, and to have ended in a promise to forward a written account; for (June 11) Barrett, with apology for delay arising from business, Lord Egremont being at Petworth when he *returned*, forwards a paper to explain his principles, of which the following is an abstract:—The method of finding the expectation of one life, and of two and three joint lives, is deduced at length. Tables are suggested having the ages, the numbers living (or their products for two or more lives), and the sums of the living, at and above each age. The method of finding the value of an annuity for any term is fully deduced (the self-taught student, who has not been in communication with other students, has but little idea of what he may omit in addressing those as well informed as himself). This value is thrown into the form  $br^{n-1} + cr^{n-2} + \dots$  divided by  $ar^n$ ,  $r$  being the amount of £1 at the end of one year. The column of  $ar^n$  is suggested, the column of the sums, and the column of the sums of sums for increasing annuities. The deductions are, the value of the whole life, the temporary and the deferred annuity, and the annual premium for a deferred annuity, payable till it commences. The rule of formation for two or more lives is described. This paper, dated June 11, 1811, is Barrett's first extant publication of his method, until (should that ever happen) the papers forwarded to Baron Maseres make their appearance. A detached specimen of the two first columns, for joint lives, is, I presume, a part of it; but it is not dated.

Baily's reply (June 17, 1811) is the letter which was published with the prospectus announcing the publication by subscription.

It gives some description, and strong praise. A postscript, which was not printed, gives some advice on publishing details, and renews the offer of assistance, especially in the arrangement of the explanations.

This prospectus was printed, but not circulated, by September 2; as appears by a letter of that date. The prospectus had stated that the mass of the tables, after the proposed selections had been printed, were to be deposited in some public institution, "for the benefit of those who may be disposed to pursue the inquiry further." This Barrett's friends thought would give a title to anyone to publish these tables, from which, at that time, he thought a profit might be derived. He accordingly proposed to cancel the words. On September 5, he acknowledges a letter correcting his erroneous impression about the copyright, and, still under the idea of a large subscription, proposed sending a prospectus to every member of both Houses of Parliament.

Next follows a circular addressed (Sept. 24) by Baily to fifteen Assurance Offices, claiming their support on the merits of the case, not merely by the order of a single copy, which it is assumed they must buy when it appears, but by a more liberal encouragement. This letter states that Barrett had been engaged for twenty-five years in his undertaking. Five answers are preserved. The directors of the Albion, "fully disposed to encourage any publications containing new and correct exemplifications of the subjects to which their business is directed," subscribed for six copies; but hinted that the Table of Three Joint Lives, not being Northampton 3 per cent., would be of no use to them. The Provident subscribed for four copies, with a similar hint; to which it was added, that Northampton 3 per cent. approximations from Barrett's Swedish Four per Cent. Table would add but little to the accuracy of existing methods. Mr. Milne, from the Sun (which Baily has forgotten in the account given in his *Appendix*), replied that he had referred the prospectus to the managers. The Atlas declined altogether, and stated that the Office was already in possession of every possible combination of two lives at 3 per cent. Mr. Baily has stated that the Westminster absolutely refused to subscribe for a single copy. This is not correct, and probably arises from his eye catching the words "consequently cannot subscribe," near the bottom of a page, when he was writing his enumeration. The answer of this Office raises a distinction which is worth attention. "There have been proposals on the subject of the same nature many times before the public, which have either been incomplete or erroneous



when carried into execution, and sometimes have gone no further than the subscription. The directors are not averse to the publishing tables, but the contrary; but they cannot put the name of the Office to what they are unacquainted with, and consequently cannot subscribe. Mr. Barrett may however be certain that, should he go on with the work, the Office will purchase at least one of the copies." Perhaps the Office might, without much departure from a very sound and difficult principle, have accepted the guarantee of the author of the *Treatise on Annuities*, which was then in its early fame. But this was quite a matter of discretion; while, as to their main reason, it is one of which every person and institution must have felt the force. *Subscribe* and *underwrite* are the same words, and are very often held to have the same meaning.

By October 21, Barrett began to see that the subscription would not succeed. His application to the members of the House of Lords had produced but four peers—Devonshire, Headfort, Cholmondeley, Romney; he had also one commoner, the well known, eccentric, but most worthy and amiable, Jack (it is impossible to say John) Fuller.

There is nothing further till January 4, 1812, when Barrett writes, in his postscript, that he has given up his intention of publishing his work. The letter itself mentions some theorem in prime numbers which had been transmitted to Mr. Barlow, and gives the following formulæ, which are worth preserving as curiosities:—

If  $n$  be the oldest age in the tables, and there be three joint lives (the annexed values being for  $n=96$ , as in the Northampton Table), the following are the number of cases under the heads mentioned:—

$$\text{Whole life annuities, } \frac{n^3 + 3n^2 + 2n}{6} = 152096;$$

$$\text{Immediate temporary annuities, } \frac{n^4 + 2n^3 - n^2 - 2n}{24} = 3612280;$$

$$\text{Deferred remainder of life annuities, } \text{the same};$$

$$\text{Deferred temporary annuities, } \frac{n^5 - 5n^3 + 4n}{120} = 67910864;$$

$$\text{All sorts together, } \frac{n^5 + 10n^4 + 35n^3 + 50n^2 + 24n}{120} = 75287520.$$

Mr. Barrett adds—"You may make what use you like of the above rules. I suppose the *Appendix* is by this time gone to the press, and therefore you will probably receive them too late to

insert at the end thereof." Baily's actual *Appendix*, as my readers know, is the paper rejected by the Royal Society. It thus appears that an appendix was the original intention, that the offer of a memoir to the Royal Society was a change of intention, and that the rejection of the offer was the cause of the return to the original plan.

This paper to be offered to the Royal Society is first mentioned as in agitation in the next letters, March 27, and April 9 and 22, 1812, in the first of which the intention of sending prospectuses to the members of the House of Commons is alluded to, and also that of publishing only the first volume, if subscribers enough should not be obtained for both. It is also mentioned that proposals had been sent to all the Universities. There was in 1814 a committee of agitation against the claim to eleven copies of every work published. This committee printed a letter from Barrett to the late Davies Gilbert (then Giddy), who had presented a petition from them to the House of Commons. This letter states that the answer of the University of Oxford was, *that the University had a right to a copy gratis; and as it was a book of reference, this one would serve all the Colleges*. The request for a subscription was not on common grounds; it was made on the plea of merit, which could not, on the most sanguine calculation, procure the means of publication except by subscription. The University, or its officers, would have done more wisely if they had kept back their reason; unless, indeed, they meant to damage their own title.

May, 7, 1812, Barrett expresses great pleasure at his employer, Lord Egremont, having become a subscriber; the want of this name had, naturally enough, been a sore subject in several of the previous letters.

May 17, Barrett expresses his pleasure with the draft of the communication to the Royal Society; and refers to the calculating rods which are described in Baily's *Appendix*. A postscript says, "By the enclosed letter of Dr. Price you will see that I had an idea of solving all the questions relating to contingent assurance previous to the publication of Mr. Morgan's papers on the subject." He reminds Baily more than once to take care of this letter.

August 22, 1812, Barrett refers to the rejection of the paper by the Royal Society, and desires to know who formed the committee of reference. This letter contains inquiries about Zerah Colburn, in whom Baily was then much interested. The same subject is resumed in September 4, 1812.

On December 11, 1812, Barrett announces that he will not

then make any further attempt to publish, but will complete the work, and leave it to his three nieces.

December 20, 1812, Barrett communicates the method of proving the logarithmic process which is published in the *Appendix* (p. 42).

February 15, 1813, he makes some remarks on the proof sheet of the *Appendix*.

March 21, 1813, he gives a graphic account of a family consultation on a proposal of Baily that some small part of the tables should be separately published; which proposal was totally and unanimously rejected.

September 19, 1813, Barrett announces the completion of his arrangements with some [the Hope] Life Office, and that he is to enter upon his duties on the 29th. This letter is the last of the series: there is one more (February 19, 1819), on a method of finding the longitude, and also a letter of Mr. Barlow's, containing reasons why it could not be efficient.

The rejection of Baily's paper on Barrett's method by the Royal Society is one of those unfortunate instances which create a fear lest there should be other communications, as valuable, which have also been rejected, but have never found such a champion as Baily. It is usual to attribute this rejection to the late William Morgan, who was at the time a member of the Council, and must doubtless have been on the committee of reference, unless his own sense of his peculiar position with respect to his assailant induced him to decline the office. But it must not be forgotten that the celebrated Thomas Young, an acute writer on annuities, was also on the Council, and as probably on the committee. Baily, who at the time I write of was in the habit of expressing himself with great force and plainness on all matters of scientific difference, was afterwards, as it happened, in open opposition to Young on the question of the *Nautical Almanac*, as he had been to Morgan on that of the correctness of annuity formulæ. No publication relative to the *Nautical Almanac* had been made by him in 1812. Morgan and Price, as is well known, had at one time possessed a mastery over the subject of life contingencies which was almost (may I not say, quite?) peculiar to themselves. Morgan himself, in spite of the occasional errors so sharply attacked by Baily, had greatly contributed to the advance of the science by his papers, and to the establishment of public confidence in it by his management of the Equitable Society. I think it may be said to be pretty well known that he had acquired a kind of feeling, that to meddle with the

subject of annuities and assurances was to poach on his manor. This weakness may have biased him in his judgment of a new and strange method; but he must not bear the blame alone: it is the business of a society to counteract the known bias of each individual member. Strong sympathies and antipathies are the frequent concomitants of energy; it is the duty of colleagues to prevent them from unduly influencing joint conclusions. In the present case, it was notorious that the author of the paper under discussion had given great offence to the member of the Council who, under ordinary circumstances, would have been the best judge of its merit. If the remembrance of that offence contributed to the rejection of the paper, the parties who permitted the result were more to blame than the individual whose natural anger had originated it.

But I must be allowed to state my own impression, that, though Morgan had not been on the Council, the rejection would still have taken place. It appears to me that the Royal Society, during the present century, has shown great want of power to appreciate improvements in calculation of results; and I am afraid I must add, that the University to which I owe my own education has been one cause of this exhibition. I think that for fifty years there was a growing tendency at Cambridge to neglect, in teaching, all that follows the resulting formula or the final equation; though I suspect that this tendency has passed its culminating point.

The first Number of this *Journal*, by a judicious use of a fortunate coincidence, opened with an historical paper, in which, for the first time in England, it was made known that the method separately invented and practised by Barrett had been published by Tetens in 1785. I may refer to the paper by Mr. Hendriks for a full account of the German publication.

It is as certain as anything can be that Barrett was a perfectly independent inventor. He knew neither French nor German; his own method was described by himself in 1811, when there was no question of a competitor, as having been worked at for 25 years, which brings the invention back to about the time when Tetens published. In our own day, a discovery made in Germany, and attracting considerable notice in that country, may have lived for years before it comes to the knowledge of an investigator living in the scientific society of London, unless he be a special cultivator of the German language, with opportunities of seeing literary notices in that language. The chance of a work like that of Tetens finding its way into the hands of a Surrey yeoman farmer or country schoolmaster, in or about 1786, is very small indeed. Further,

the work of Tetens acquired no notoriety in England. Milne, who knew the continental authors better than any of his contemporary writers, does not allude to it in the summary given in the article 'Annuities' in the *Encyclopædia Britannica*; nor is the book itself, to a cursory examiner, suggestive of anything new. I have had it in my possession for twenty years; but, not reading German with anything the least approaching to fluency, and seeing by the commencement and by the tables *at the end*\* of the first volume that the work seemed mainly intended to combine the recent English writings with those already known in Germany, I never attempted any close examination of it.

Tetens, as Mr. Hendriks has remarked, described the use of the columns C and M; which Barrett† did not do. It may reasonably be supposed that he saw the application of his own method to any question which is solved by the form  $bx^{n-1} + cx^{n-2} + \dots$  divided by  $ax^n$ ; but he makes no incidental remarks: even when he forms his columns for the expectation of life, in explaining his method to Baily, he does not drop a word on the facility with which the temporary or deferred expectation may be found. The points of view of the two men differed greatly. Barrett was occupied with the production of vast results, and valued his method because it produced those results; Tetens exhibits an easier method of doing what others had already done, and does not seem greatly struck with the power of doing more which that method would give. Hence, probably, the reason why Barrett did not care for such columns as C and M and R. He could not hope to repeat them on a table of three joint lives: so that he was contented with the facilities which his own D and N columns gave to problems of reversions, as well as to problems of annuities. If a table of three lives were now undertaken, we may be sure that the D and N columns would be all that would be contemplated; and even in the case of two lives Mr. David Jones has (most judiciously) not attempted more.

Again, part of the merit of an invention consists in its mode of introduction. Barrett introduced his method by using the proper means: Tetens so completely failed in introduction, by not using the proper means, that in all probability he never would have been heard of in the matter, if it had not been for Barrett's success. If Barrett had gone to Baily with only a new method, it is very

\* If Tetens had put the table of his page 89 at the end of the volume with the rest, his claims would probably have had earlier notice given of them.

† The M column was invented, in this country, by Mr. Griffith Davies.

possible that he might have failed in gaining attention. Ninety-nine men out of a hundred cannot see the advantage of a process which is more simple than their own; merely because, before they have mastered it by practice, it is *not* so simple to them as the one in which they have acquired facility. Young students who have learned the ordinary rule for extracting the square root, when first shown how to contract the work and get nearly double the number of root figures, will not unfrequently prefer to work the required number of places by the full method, rather than learn a new process. But when Barrett affirmed the *existence* of a table of three joint lives, which would give even temporary and deferred annuities by at most one subtraction and division, he forced a hearing, and proved that he was a person whose claims it would not be even safe in point of character to neglect; and therefore Baily kept a copy of his answer to the letter in which this statement was made.

We have here one more instance in which, when the proper time has arrived, discovery suggests itself to more than one person. No one, unless he have attended much to the history of science, knows how very frequently this has happened: it is almost a rule. From the time when Adriannus Romanus and Vieta—one in Belgium, the other in France—were in independent and simultaneous possession of a new development of trigonometry, to that in which Adams and Leverrier were at work upon their memorable problem, and to that in which Lassell in England and Bond in America discovered the eighth satellite of Saturn almost at the same moment, there is a long chain of accordances, the history of which can hardly be well written except in parallel columns.

In the present case, I have no doubt that to Barrett is due an acknowledgment of a much higher order than to Tetens. The first was a self-educated country farmer; the second was a highly cultivated professor of mathematics. The first invented his means of publication; the second used those presented by his position. The first sacrificed a quarter of a century to his determination that the public should not only have the discovery, but the benefit of it; the second gave them the discovery, that those who pleased might benefit the public by it. The first succeeded in making his method of daily use, and of such notoriety that in process of time the discovery of the second was itself discovered; and the discoverer of the discovery deserves no small credit for his unusual research. Nor do I neglect the obvious consideration, that Barrett was in England, where the subject was very much studied, while Tetens

was in Germany, where till lately it was hardly known in its applications. This difference of locality is connected with other points, which are of more importance in an opposite direction. Barrett was in a country in which even obvious improvements upon highly valued arts meet with cold looks and niggard encouragement, when they are not introduced under very influential patronage; he was neglected both by the Royal Society, the Assurance Offices, and the public. Tetens was in a country in which speculation is valued, even in subjects the applications of which are neglected; he occupied honourable and well paid posts in education and in revenue, and died a privy councillor. For all these reasons, I am well satisfied that the important improvement on which I have been writing should, as I am satisfied it will, continue to be called *Barrett's method*.

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*On the Rates of Mortality prevailing amongst the Male and Female Lives assured in the Eagle Insurance Company during the 44 years ending 31 December, 1851. By CHARLES JELlicoe, Actuary to that Company.*

[Read before the Institute of Actuaries, 2nd January, 1854, and ordered by the Council to be printed.]

IN discussing the subject of assurance valuations and the most approved methods of making them, I have often had occasion to draw attention to the great importance of ascertaining with the utmost possible accuracy the rates of mortality and interest which have been found to prevail in any case under consideration, so as to determine what rates of premium are really required to provide, independently of other exigencies, for the sums assured, and how far the particular rates charged are sufficient or more than sufficient for that purpose. I have insisted the more strenuously on the necessity of this proceeding, from the conviction that in almost every Association some peculiarity in the prevailing mortality will be found to exist, distinguishing it from that of its neighbour, and arising from the different character of such influences as the condition of life of the persons whose lives are assured, the mode of selection, the greater or less predominance of the male sex and of assurances made by persons on their own lives over such as are effected on the lives of others, the constitution of the Company, and so on. Almost every Association, differing from the rest in

one or more of these characteristics, will be found, as I fully believe, to present peculiar features in its experience; and hence, although we must necessarily be guided at first by such data as older Societies afford, it is, as I have said, of great importance to obtain that of the Association whose affairs we may desire to investigate, so soon as its duration and the number of its members is sufficiently great to afford it with anything like the requisite degree of precision.

Influenced by considerations of this kind, the directors of the Eagle Insurance Company have caused an investigation to be made into the rates of mortality prevailing in that Office throughout the term of its existence, and have considerably allowed the results now to be made public, believing them to possess some interest for those engaged in similar inquiries. Before making any comment upon these, it will be desirable to state briefly the several processes by which they were elaborated, and the precautions taken to secure as high a degree of accuracy as possible in each and all of them.

As in most other Societies of similar age and character, the instances of several assurances being effected on the same life were found to be numerous; and the first care was therefore to eliminate all duplicate assurances, and to restrict the observation in every case to the first, or at least to one assurance only, on each life.

Notwithstanding what has been said to the contrary, there can be no doubt that the omission of this process, and the enumeration of *policies* in such investigations as if they were *persons*, is likely to lead to conclusions more or less erroneous. In the case under consideration, there can be no doubt that it would have done so.

Having then reduced the registers of the Company to a list of the persons assured in which the name of each individual appeared but once, and which comprised only such as were considered at the time of their entering to be of unimpaired health and constitution, a careful record was made of the age at admission, the number of years continuance, and the age at death or discontinuance, of all the lives, each sex being taken out separately. In this way tables were constructed of the following description; the continuance of each person throughout the year, his death or discontinuance in it, and his existence at the time the observation terminated, being denoted by unity and the letters *d*, *l*, and *e* respectively :\*—

\* These tables occupy 152 half sheets of "Royal" paper, and comprise, exclusively of other items, upwards of sixty thousand entries in the columns headed with the age.





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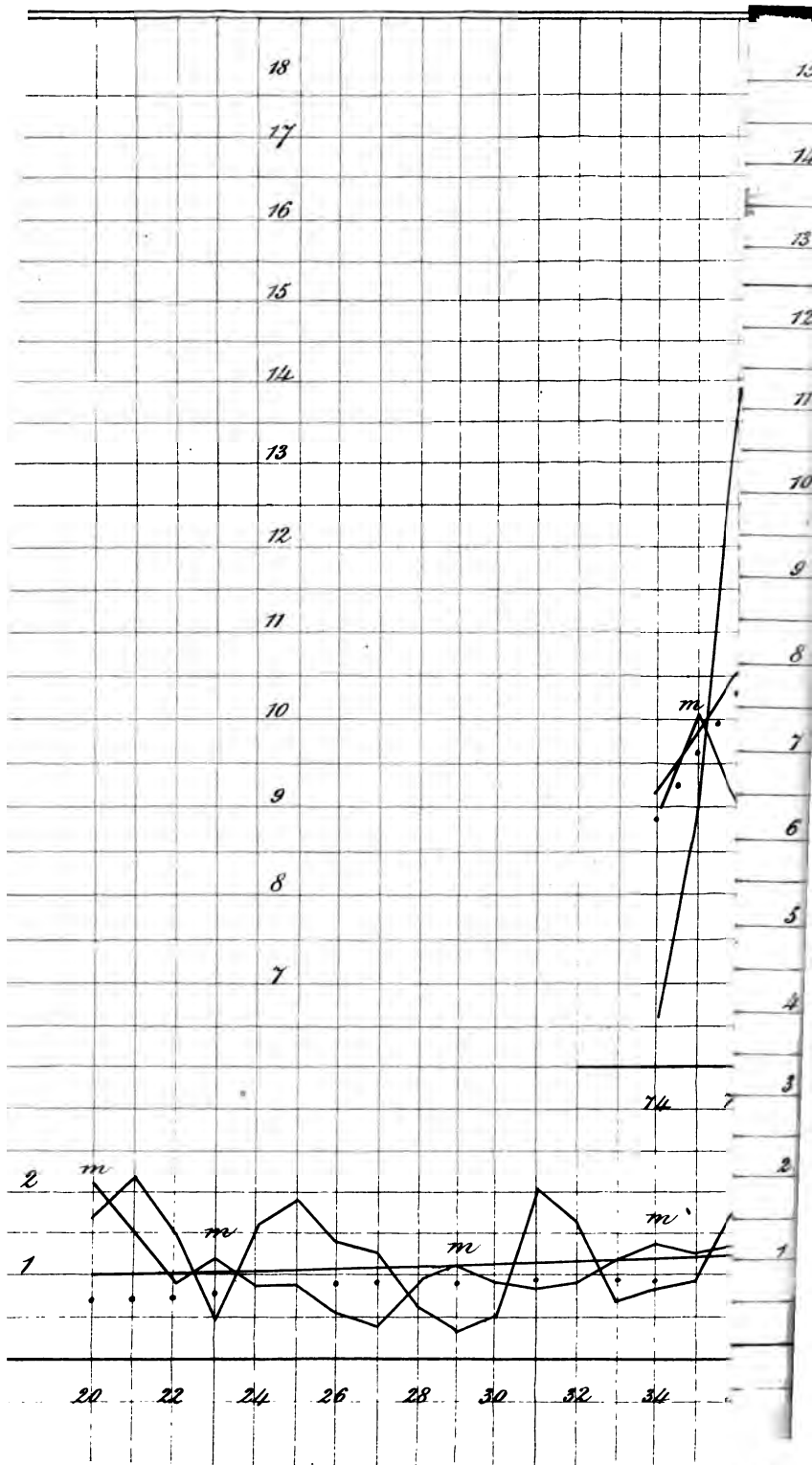
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\* These tables occupy 152 half sheets of "Royal" paper, and comprise, exclusively of other items, upwards of sixty thousand entries in the columns headed with the age.





Males.

Number of Policy.	9½	10½	11½	12½	13½	&c.	91½	92½	93½	94½	95½	96½
79,020	1	1	1	1	1	&c.	1	1	d			
79,200	1	1	1	d	..	&c.						
80,100	..	..	..	1	1	&c.	1	1	1	1	d	
81,111	..	..	..	..	..	&c.	1	e				
81,120	..	..	..	..	1	&c.						
81,200	..	..	1	1	1	&c.	d					
81,300	..	..	..	..	1	&c.	1	1	1	e		
81,321	..	..	..	1	1	&c.	1	e				
Completed age	2	2	3	4	6	&c.	5	3	2	1		
Lapsed ....	..	..	..	..	..	&c.						
Existing ....	..	..	..	..	..	&c.	..	2	..	1		
Died .....	..	..	..	1	..	&c.	1	..	1	..	1	

It will be seen that the system adopted in this and the following tables is that pursued by Mr. Galloway in his report of the mortality amongst the members of the Amicable Society—that is to say, as regards the time of admission, the *Office age* is in every case assumed to be greater by six months than *the real age*; in other words, age 10 is called 9½; age 11, 10½; and so on. This assumption is not rigidly accurate, since it appears on investigation that the Office age is, on the average, but little more than four months in excess of the real age. The effect of it is therefore to represent the lives as, one with another, two months younger than they really were. This discrepancy I have not, any more than Mr. Galloway, thought it worth while to endeavour to correct; inasmuch as its minuteness renders it very unimportant, and as the effect of it will generally be, in making calculations based upon the table, to bring out results in a very trifling degree (if in any) on the safe side. In this, as in other respects, Mr. Galloway's arrangement appears to me to be the best which has hitherto been devised. As that gentleman observes, "The single assumption introduced is, that the admissions take place, one with another, precisely at the middle of the current year of age; all the rest is matter of calculation." There may be defects, it is true, in this method; but whatever there are are equally to be found in Mr. Morgan's and in Mr. Woolhouse's, whilst these last are wanting in the simplicity which, in this rather material point at least, characterizes Mr. Galloway's.

Having, then, in these two tables a complete record of the

duration, &c. of all the lives under consideration, the next care was to collect the results with a view to arrive at the rates of mortality which they severally indicate. This process will be seen in Tables I., II., and III., which give the usual particulars so often described by writers on this subject. On these particulars it is therefore unnecessary for me to dwell, further than to mention that it has not been thought worth while to avoid fractions in these tables by "doubling"; and that, as regards the usual allowance of half a year's duration made in the case of abandoned and surrendered assurances, the regulations of the Company are such as to give quite sufficient justification of it.

We have here, then, presented the experience as to duration of life of a population consisting of 7,419 individuals—viz., 5,493 males and 1,926 females—selected with more or less care from amongst persons for the most part in the middle and upper ranks of life, and traced from year to year for a period, on the average, of about eight years and a half from the time of their admission; the age of each being, in the great majority of cases, ascertained by certificate or authenticated by formal declaration. As regards the results exhibited when the sexes are distinguished, I have not thought it worth while to tabulate in each case more than the mortality per cent. and the probable mean duration of life—or after-lifetime, as Mr. Farr aptly calls it. These elements afford a good means of comparison, and will enable us sufficiently to judge of the relative vitality of the sexes as between each other, and as contrasted with that which the best authenticated tables exhibit. For greater facility, the following statements give these particulars in decennial groups and at quinquennial epochs.

*Annual Mortality per cent., in decennial groups.*

AGE.	MALE LIVES.				FEMALE LIVES.			
	Eagle Experience.	Carlisle Table.	Experience of Offices.	Northampton Table.	Eagle Experience.	English Life Table.	Government Annuitants.	Experience of Offices.
20—29	1·03	·76	·77	1·56	1·31	·95	·88	1·68
30—39	1·19	1·05	·92	1·86	1·53	1·14	1·05	1·57
40—49	1·74	1·42	1·23	2·38	1·63	1·34	1·17	1·58
50—59	2·63	1·86	2·14	3·32	2·35	2·06	1·50	2·24
60—69	4·77	4·08	4·36	4·91	4·24	4·05	2·88	3·98
70—79	11·10	8·80	9·42	9·19	8·12	9·16	7·11	11·86
	3·75	3·00	3·14	3·88	3·19	3·11	2·43	3·81

*Probable Mean Duration of Life.*

Age.	MALE LIVES.				FEMALE LIVES.			
	Eagle Experience.	Carlisle Table.	Experience of Offices.	Northampton Table.	Eagle Experience.	English Life Table.	Government Annuity.	Experience of Offices.
20	37.9	41.5	41.5	33.4	37.6	41.	44.0	35.9
25	35.4	37.9	38.0	30.9	35.4	38.	40.8	34.4
30	31.6	34.3	34.4	28.3	32.3	34.	37.6	31.7
35	28.2	31.0	30.9	25.7	29.1	31.	34.3	29.1
40	25.0	27.6	27.3	23.1	26.8	28.	31.1	26.4
45	21.7	24.5	23.7	20.5	23.8	24.	27.8	23.2
50	18.7	21.1	20.2	18.0	20.7	21.	24.4	20.1
55	15.4	17.6	16.9	15.6	17.6	18.	20.8	16.8
60	12.8	14.3	13.8	13.2	14.8	14.	17.3	13.8
65	10.2	11.8	11.0	10.9	11.8	12.	14.0	10.6
70	7.6	9.2	8.5	8.6	9.8	9.	11.0	7.9
75	5.7	7.0	6.5	6.5	7.	7.	8.5	5.4
80	3.9	5.5	4.8	4.8	5.8	5.	6.5	4.8

From these tables it appears that although the rate of mortality amongst the female lives is high comparatively at the earlier ages, it is much the reverse towards the decline of life, and that these aberrations nearly balance each other; so that the expectation in their case is throughout somewhat better than that shown to exist amongst the male portion of the assured. The close resemblance between the experience of the Eagle Company and that of the combined Offices, as regards female lives, is remarkable, and gives confirmation to the accuracy of both; but the rates of mortality at given periods of life differ considerably, notwithstanding. On the whole, the contrast which the data exhibit between the two sexes is consonant with what might be expected from their relative positions. The wear and tear of female life is unquestionably great from twenty to forty, whilst those who outlive this period have for the most part little to disturb the serenity of their declining years. The male sex, on the contrary, though probably possessing more vigour in its prime, is exposed to the labours and anxieties of life to a much later period, and their effect when it approaches is in consequence the more sensibly felt. One inference is, at all events, fully supported by these data—viz., that the insurance of female life at less rates than that of male is scarcely justifiable. A comparison with the expectation of the Carlisle Table or the Experience of Offices will suffice to establish this beyond controversy. The duration of female life may, it is true, be greater than that of male in certain given instances; but until it comes near either of

the standards above mentioned, there is no room for any reduction in favour of the fairer portion of the community.

As might be expected, the blended experience of the Company exhibits features partaking of the character of the mortality prevailing amongst the assured of either sex when taken separately. The following table shows the rate of mortality per cent. and the expectation of life as before; the numbers for each sex being blended, and the results of other tables being added, for the purpose of comparison.

MORTALITY PER CENT.				EXPECTATION OF LIFE.			
Age.	Eagle Males & Females.	Northampton Table.	Carlisle Table.	Age.	Eagle Males & Females.	Northampton Table.	Carlisle Table.
20—29	1.10	1.56	.76	20	38.1	33.4	41.5
30—39	1.26	1.86	1.05	30	32.1	28.3	34.3
40—49	1.71	2.38	1.42	40	25.7	23.1	27.6
50—59	2.52	3.32	1.86	50	19.6	18.0	21.1
60—69	4.55	4.91	4.08	60	13.7	13.2	14.3
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For this purpose, let us suppose that the rate in question does increase with the age in a certain progression; it will then follow that a corresponding relation will obtain between successive quantities expressing that rate, taken at equal intervals, let the dimensions of these last be what they may. If, then, we have the relation which exists between equal successive aggregations of such quantities, we can arrive at that subsisting between the quantities themselves. Now this, the formula which Mr. Gompertz has deduced from his hypothesis enables us, I find, very readily to do; for, by a slight modification of it, we can obtain an expression for the rate of mortality at any given interval, in terms of the several aggregate rates comprised in the original table.\* This expression it will be convenient to denote by  $\Delta.N$ , where

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But although there would appear to be a tendency in some data to yield the quantities  $m$ ,  $mp$ ,  $mp^2$ ,  $mp^3$ , &c., in a constant proportion, it will scarcely ever be found, as I have said, that they exactly obey that order throughout; and hence arises a necessity for certain changes in the values of some of the quantities in the equation above given. Now it is one of the advantages of the method we are discussing, that any incongruity in the curves or series arising under these changes can be detected with the least possible trouble; and thus a long step is gained in the way of finding a remedy for it, since with some little management a remedy can generally be supplied. It will be observed, for instance, that whatever the values of  $m$  and  $p$ , the rate of mortality at any given age can be ascertained at once; and hence the last term of a series and the first of a following one can be compared with very little labour. If these be inconsistent, another mode of grouping the quantities in the unadjusted table must be resorted to; and it will generally be found, I believe, that a very exact correspondence can be obtained between such series as may be required, with the exercise of a little patience and a moderate degree of dexterity.\*

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the standards above mentioned, there is no room for any reduction in favour of the fairer portion of the community.

As might be expected, the blended experience of the Company exhibits features partaking of the character of the mortality prevailing amongst the assured of either sex when taken separately. The following table shows the rate of mortality per cent. and the expectation of life as before; the numbers for each sex being blended, and the results of other tables being added, for the purpose of comparison.

MORTALITY PER CENT.				EXPECTATION OF LIFE.			
AGES.	Eagle Males & Females.	Northampton Table.	Carlisle Table.	AGES.	Eagle Males & Females.	Northampton Table.	Carlisle Table.
20—29	1.10	1.56	.76	20	38.1	33.4	41.5
30—39	1.26	1.86	1.05	30	32.1	28.3	34.3
40—49	1.71	2.38	1.42	40	25.7	23.1	27.6
50—59	2.52	3.32	1.86	50	19.6	18.0	21.1
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determining the ratios throughout the table, and that, although three different equations are required, the points of junction of the three curves generated by them are barely perceptible. In the first, for instance,  $p=1.149$  and  $m=10.996$ ; the logarithm of  $\frac{m}{1-p}$  consequently  $=1.86804$ , and  $\frac{\lambda p}{n}=.00603$ . Hence, commencing with the first logarithm, and continually adding the second, we obtain the following series of logarithms and their corresponding natural numbers, and the differences between these last form the table in column 7, page 214, from age 20 to 40. Thus,

1.86804....	73.797.....	1.032....	20
1.87407....	74.829.....	1.046....	21
1.88010....	75.875.....	1.060....	22
1.88613....	76.936.....	1.075....	23
1.89216....	78.011.....	1.090....	24
1.89819....	79.101.....	&c.	&c.
&c.	&c.		

In the same way the series is continued from 40 to 60,  $p$ , however, in this portion being equal to 1.477, and  $m$  to 17.078; whilst the remainder of the table is formed by changing the value of those quantities to 2.118 and 45.506 respectively, and proceeding as before. In the new series thus obtained, the sums of the terms from 20 to 29, 30 to 39, &c., are the same as those of the like terms of the original table; and thus the aggregate mortality exhibited by each at those periods is identical, whilst the decennial rate of progression indicated by them is duly imparted in this way to the annual rate. It is perhaps hardly necessary to mention, that the value of  $p$  is found by dividing any one group by that

which precedes it; and that it should be thus equal to  $\frac{m_2}{m_1}$ ,  $\frac{m_3}{m_2}$ ,  $\frac{m_4}{m_3}$ , &c., if we denote the successive groups by  $m_1$ ,  $m_2$ ,  $m_3$ , &c. If each fraction give a different value of  $p$ , then such different value will have to be employed throughout the groups indicated by the denominator and numerator of the fraction. If the same value result from each, then one equation will suffice for the whole series.

By such means, then, has the adjusted table in column 8, page 214, been constructed; and in order that the degree of its resemblance to the original one may be judged of, I have given the numbers expressing the mean duration of life, as well as those denoting the mortality per cent. per annum, yielded by both. The

values of  $m$  as above given, it will be seen, coincide with the rates of mortality per cent. quoted at page 204, the latter however being one tenth only (as they of course should be) of such values.\*

A further evidence as to the degree of identity between the two tables is to be found in the fact of the survivors being frequently the same, or very nearly the same, in number at the same age in each; this it will be observed is the case at ages 30, 40, 50, 60, 65, 70, 73, 80, &c.

Having thus determined, at least as far as is practicable, the true rate of mortality prevailing amongst the persons assured with the Company, it only remains to find the rate of interest actually realized from year to year, and with these elements to construct the tables on which Societies of this description base their ordinary charges. If the profits which are derived from other sources be considered as interest—and they can scarcely be regarded in any other light—there is no doubt that a higher rate of interest than 4 per cent. per annum, on the average, is very commonly obtained. I have however assumed, that the true rate in the present instance is 4 per cent. per annum; and the tables of annuities in column 11, and of annual premiums in column 12, pages 214 and 215, have been calculated at that rate accordingly. Supposing then these elements to be correctly assumed, the annual premiums so derived from them represent truly the payments required to provide for the sums assured merely; and a comparison with those actually charged will serve to show the margin, or contribution made at every age to the general surplus fund. It is this margin or contribution which I have so often insisted that we should endeavour to keep the same for each contributor, after making allowance for the one peculiar charge of commission.

In conclusion, I have only to state that the abstracts have been made and the tables constructed (every item being carefully checked) by two of our members, Mr. Arthur Hutcheson Bailey and Mr. John Lauer Oliver, to whose ability and accuracy in these and similar investigations I with much pleasure take this opportunity to bear testimony.

\* The values obtained by the equation are, in fact, those of ordinates to the adjusted curve given in the diagram, the sum total of them being equal, or very nearly equal, to the sum total of the irregular numbers in column 3, pages 214 and 215.

TABLE I.—Males.

Age (x).	Completed the Age $x - \frac{1}{2}$ .	Existing 31 Dec. 1851, between the Ages $x - \frac{1}{2}$ and $x + \frac{1}{2}$ .	Discontinued between the Ages $x - \frac{1}{2}$ and $x + \frac{1}{2}$ .	Died between the Ages $x - \frac{1}{2}$ and $x + \frac{1}{2}$ .	Number exposed to the risk of Death between the Ages $x - \frac{1}{2}$ and $x + \frac{1}{2}$ .	Number exposed to the risk of Death between the Ages $x$ and $x + 1$ .	Number who Died between the Ages $x$ and $x + 1$ .	Mortality per cent. per Annum.	Mean Duration of Life.	Age (x).
10	29	..	2	..	28.0	58.5	..	0.0000	..	10
11	34	3	4	..	30.5	61.0	..	0.0000	..	11
12	31	..	1	..	30.5	72.0	..	0.0000	..	12
13	43	1	2	..	41.5	87.0	..	0.0000	..	13
14	48	3	2	..	45.5	107.0	1	0.9346	..	14
15	66	5	4	1	61.5	126.0	2	1.5873	..	15
16	70	6	5	1	64.5	136.0	2	1.4706	..	16
17	74	..	5	1	71.5	150.5	1	0.6645	..	17
18	82	3	3	..	79.0	171.5	1	0.5831	..	18
19	99	7	6	1	92.5	201.5	2	0.9926	..	19
20	116	6	8	1	109.0	236.0	5	2.1186	37.91	20
21	151	3	45	4	127.0	323.5	5	1.5456	37.71	21
22	216	5	34	1	196.5	462.0	4	0.8658	37.31	22
23	288	5	40	3	265.5	583.0	7	1.2007	36.62	23
24	344	8	45	4	317.5	716.0	6	0.8380	36.05	24
25	434	14	57	2	398.5	880.0	7	0.7955	35.35	25
26	518	11	62	5	481.5	1014.0	5	0.4931	34.64	26
27	577	18	71	..	532.5	1145.5	5	0.4365	33.81	27
28	661	15	81	5	613.0	1286.5	12	0.9328	32.95	28
29	723	28	71	7	673.5	1418.5	16	1.1280	32.27	29
30	792	23	71	9	745.0	1578.0	14	0.6872	31.63	30
31	891	27	89	5	833.0	1724.0	13	0.7541	30.90	31
32	943	29	75	8	891.0	1865.5	16	0.8577	30.13	32
33	1029	36	73	8	974.5	2027.0	24	1.1840	29.39	33
34	1114	35	88	16	1052.5	2152.0	31	1.4405	28.73	34
35	1160	33	88	15	1099.5	2272.5	29	1.2761	28.15	35
36	1226	36	70	14	1173.0	2379.5	34	1.4289	27.51	36
37	1271	45	84	20	1206.5	2464.5	36	1.4607	26.90	37
38	1321	42	84	16	1258.0	2568.0	34	1.3240	26.29	38
39	1371	48	74	18	1310.0	2634.0	35	1.3228	25.64	39
40	1391	50	84	17	1324.0	2649.5	33	1.2455	24.97	40
41	1387	47	76	16	1325.5	2664.5	35	1.3136	24.29	41
42	1401	55	69	19	1339.0	2686.0	40	1.4892	23.60	42
43	1405	52	64	21	1347.0	2702.0	48	1.7765	22.95	43
44	1407	47	57	27	1355.0	2697.0	45	1.6685	22.35	44
45	1412	62	78	18	1342.0	2654.5	41	1.5446	21.72	45
46	1386	72	75	23	1312.5	2575.5	55	2.1355	21.06	46
47	1324	60	62	32	1263.0	2501.5	53	2.1187	20.51	47
48	1291	48	57	21	1238.5	2456.5	46	1.8725	19.94	48
49	1274	51	61	25	1218.0	2387.5	53	2.2199	19.31	49
50	1227	56	59	28	1169.5	2287.0	42	1.8364	18.74	50

TABLE I.—*Males* (continued).

Age ( <i>x</i> ).	Completed the Age $x-\frac{1}{2}$ .	Existing 31 Dec. 1851, between the Ages $x-\frac{1}{2}$ and $x+\frac{1}{2}$ .	Discontinued between the Ages $x-\frac{1}{2}$ and $x+\frac{1}{2}$ .	Died between the Ages $x-\frac{1}{2}$ and $x+\frac{1}{2}$ .	Number exposed to the risk of Death between the Ages $x-\frac{1}{2}$ and $x+\frac{1}{2}$ .	Number exposed to the risk of Death between the Ages $x$ and $x+1$ .	Number who Died between the Ages $x$ and $x+1$ .	Mortality per cent. per Annum.	Mean Duration of Life.	Age ( <i>x</i> ).
51	1176	67	50	14	1117.5	2209.5	35	1.5841	18.08	51
52	1138	59	33	21	1092.0	2130.5	39	1.8305	17.36	52
53	1091	72	33	18	1038.5	2034.5	34	1.6712	16.67	53
54	1045	61	37	16	996.0	1935.5	50	2.5833	15.95	54
55	988	59	38	34	939.5	1816.0	57	3.1387	15.36	55
56	917	50	31	23	876.5	1703.0	54	3.1709	14.84	56
57	869	50	35	31	826.5	1600.0	59	3.6875	14.31	57
58	805	35	28	28	773.5	1504.5	51	3.3899	13.85	58
59	767	48	24	23	731.0	1420.5	49	3.4494	13.31	59
60	717	30	25	26	689.5	1324.0	46	3.4743	12.77	60
61	662	40	15	20	634.5	1221.0	45	3.6855	12.21	61
62	616	40	19	25	586.5	1109.0	51	4.5988	11.66	62
63	558	53	18	26	522.5	981.5	46	4.6865	11.19	63
64	481	35	9	20	459.0	867.0	40	4.6136	10.72	64
65	429	32	10	20	408.0	767.0	33	4.3025	10.21	65
66	376	27	7	13	359.0	688.0	28	4.0698	9.65	66
67	338	12	6	15	329.0	621.5	31	4.9880	9.04	67
68	309	31	2	16	292.5	552.0	36	6.5218	8.49	68
69	272	15	10	20	259.5	487.5	33	6.7693	8.05	69
70	234	11	1	13	228.0	430.5	24	5.5750	7.59	70
71	209	11	2	11	202.5	381.5	33	8.6500	7.01	71
72	187	9	7	22	179.0	323.5	40	12.3648	6.63	72
73	151	11	2	18	144.5	261.5	27	10.3251	6.49	73
74	123	10	2	9	117.0	211.5	19	8.7834	6.18	74
75	103	12	5	10	94.5	168.5	17	10.0890	5.73	75
76	77	6	..	7	74.0	134.0	12	8.9552	5.32	76
77	64	8	..	5	60.0	108.0	13	12.0371	4.79	77
78	50	3	1	8	48.0	86.5	14	16.1850	4.38	78
79	40	2	1	6	38.5	66.5	12	18.0451	4.13	79
80	31	5	1	6	28.0	45.5	8	17.5824	3.93	80
81	19	3	..	2	17.5	31.0	5	16.1290	3.66	81
82	14	1	..	3	13.5	23.5	5	21.2765	3.26	82
83	10	..	..	2	10.0	17.5	3	17.1429	3.01	83
84	8	..	1	1	7.5	14.5	5	34.4830	2.53	84
85	7	..	..	4	7.0	10.0	4	40.0000	..	85
86	3	..	..	..	3.0	6.0	..	00.0000	..	86
87	3	..	..	..	3.0	6.0	2	33.3333	..	87
88	3	..	..	2	3.0	4.0	2	50.0000	..	88
89	1	..	..	..	1.0	2.0	..	00.0000	..	89
90	1	..	..	..	1.0	2.0	1	50.0000	..	90
91	1	..	..	1	1.0	1.0	1	100.0000	..	91

TABLE II.—Females.

Age $x$ .	Completed the Age $x-\frac{1}{2}$ .	Existing 31 Dec. 1851, between the Ages $x-\frac{1}{2}$ and $x+\frac{1}{2}$ .	Discontinued between the Ages $x-\frac{1}{2}$ and $x+\frac{1}{2}$ .	Died between the Ages $x-\frac{1}{2}$ and $x+\frac{1}{2}$ .	Number exposed to the risk of Death between the Ages $x-\frac{1}{2}$ and $x+\frac{1}{2}$ .	Number exposed to the risk of Death between the Ages $x$ and $x+1$ .	Number who Died between the Ages $x$ and $x+1$ .	Mortality per cent. per Annum.	Mean Duration of Life.	Age $x$ .
10	40	1	..	..	39.5	91.0	..	0.0000	..	10
11	53	1	2	..	51.5	109.0	1	0.9174	..	11
12	60	2	3	1	57.5	113.0	2	1.7699	..	12
13	59	4	3	1	55.5	114.5	2	1.7467	..	13
14	62	2	4	1	59.0	117.5	2	1.7021	..	14
15	60	1	2	1	58.5	116.5	1	0.8584	..	15
16	61	4	2	..	58.0	119.0	..	0.0000	..	16
17	64	5	1	..	61.0	126.5	..	0.0000	..	17
18	69	4	3	..	65.5	140.0	1	0.7143	..	18
19	78	1	6	1	74.5	159.0	2	1.3579	..	19
20	87	2	3	1	84.5	175.0	3	1.7143	37.62	20
21	107	4	29	2	90.5	182.5	4	2.1918	37.27	21
22	95	3	3	2	92.0	203.0	3	1.4778	37.09	22
23	114	2	4	1	111.0	233.5	1	0.4283	36.64	23
24	127	3	6	..	122.5	249.5	4	1.6032	35.80	24
25	137	6	14	4	127.0	257.5	5	1.9418	35.37	25
26	136	4	7	1	130.5	277.5	4	1.4414	35.06	26
27	154	4	10	3	147.0	306.5	4	1.3050	34.57	27
28	165	7	4	1	159.5	325.0	2	0.6154	34.02	28
29	175	6	13	1	165.5	348.0	1	0.2874	33.22	29
30	190	4	11	..	182.5	376.0	2	0.5319	32.32	30
31	203	6	13	2	193.5	401.0	8	1.9950	31.49	31
32	217	5	14	6	207.5	422.5	7	1.6568	31.11	32
33	223	7	9	1	215.0	449.0	3	0.6682	30.62	33
34	243	6	12	2	234.0	488.5	4	0.8188	29.82	34
35	265	8	13	2	254.5	527.5	5	0.9479	29.07	35
36	288	17	13	3	273.0	565.5	11	1.9451	28.34	36
37	302	9	10	8	292.5	609.0	13	2.1346	27.89	37
38	324	7	8	5	316.5	661.5	16	2.4187	27.49	38
39	356	10	12	11	345.0	717.0	16	2.2315	27.16	39
40	387	8	22	5	372.0	762.0	13	1.7060	26.77	40
41	403	9	17	8	390.0	803.0	14	1.7434	26.22	41
42	430	17	17	6	413.0	835.5	10	1.1969	25.68	42
43	437	15	14	4	422.5	856.5	13	1.5178	24.98	43
44	449	18	12	9	434.0	887.5	15	1.6901	24.36	44
45	468	15	14	6	453.5	924.0	13	1.4069	23.77	45
46	490	17	22	7	470.5	960.5	13	1.3534	23.10	46
47	504	17	11	6	490.0	992.0	15	1.5122	22.41	47
48	519	20	14	9	502.0	1018.5	23	2.2581	21.75	48
49	536	27	12	14	516.5	1035.0	20	1.9324	21.24	49
50	536	15	20	6	518.5	1035.5	16	1.5451	20.65	50
51	539	22	22	10	517.0	1032.0	17	1.6473	19.96	51
52	535	21	19	7	515.0	1036.0	18	1.7375	19.29	52

TABLE II.—*Females* (continued).

Age $x$ .	Completed the Age $x-\frac{1}{2}$ .	Existing 31 Dec. 1851, between the Ages $x-\frac{1}{2}$ and $x+\frac{1}{2}$ .	Discontinued between the Ages $x-\frac{1}{2}$ and $x+\frac{1}{2}$ .	Died between the Ages $x-\frac{1}{2}$ and $x+\frac{1}{2}$ .	Number exposed to the risk of Death between the Ages $x-\frac{1}{2}$ and $x+\frac{1}{2}$ .	Number exposed to the risk of Death between the Ages $x$ and $x+1$ .	Number who Died between the Ages $x$ and $x+1$ .	Mortality per cent. per Annum.	Mean Duration of Life.	Age $x$ .
53	542	23	19	11	521.0	1041.5	23	2.2083	18.62	53
54	535	16	13	12	520.5	1046.0	31	2.9637	18.03	54
55	542	17	16	19	525.5	1051.0	31	2.9495	17.57	55
56	538	16	9	12	525.5	1033.5	21	2.0320	17.09	56
57	527	24	14	9	508.0	1013.0	23	2.2704	16.43	57
58	524	27	11	14	505.0	992.5	27	2.7204	15.80	58
59	505	28	7	13	487.5	961.0	33	3.4339	15.23	59
60	494	31	10	20	473.5	915.5	29	3.1677	14.75	60
61	457	23	7	9	442.0	853.5	23	2.6948	14.22	61
62	429	24	11	14	411.5	792.5	29	3.6593	13.60	62
63	394	22	4	15	381.0	727.5	22	3.0240	13.10	63
64	365	31	6	7	346.5	668.0	17	2.5449	12.49	64
65	333	18	5	10	321.5	623.5	24	3.8492	11.80	65
66	312	14	6	14	302.0	577.0	25	4.3328	11.25	66
67	288	19	7	11	275.0	524.5	28	5.3384	10.74	67
68	261	19	4	17	249.5	469.0	37	7.8891	10.32	68
69	228	17	..	20	219.5	404.5	24	5.9332	10.16	69
70	194	17	1	4	185.0	353.0	17	4.8159	9.77	70
71	175	12	2	13	168.0	312.5	21	6.7200	9.24	71
72	151	12	1	8	144.5	267.5	11	4.1121	8.87	72
73	130	14	..	3	123.0	235.0	8	3.4042	8.23	73
74	118	10	2	5	112.0	208.0	14	6.7307	7.50	74
75	101	9	1	9	96.0	178.0	16	8.9888	7.00	75
76	83	2	..	7	82.0	152.5	21	13.7705	6.65	76
77	74	7	..	14	70.5	122.5	16	13.0612	6.63	77
78	53	2	..	2	52.0	99.5	7	7.0350	6.55	78
79	49	3	..	5	47.5	87.5	11	12.5719	6.01	79
80	41	2	..	6	40.0	73.5	9	12.2449	5.80	80
81	34	1	..	3	33.5	62.5	7	11.2000	5.54	81
82	30	2	..	4	29.0	52.0	6	11.5386	5.17	82
83	24	2	..	2	23.0	43.0	3	6.9767	4.78	83
84	20	..	..	1	20.0	38.0	4	10.5263	4.10	84
85	19	2	..	3	18.0	31.0	6	19.3549	3.53	85
86	14	2	..	3	13.0	22.0	5	22.7273	3.25	86
87	9	..	..	2	9.0	16.0	4	25.0000	3.06	87
88	7	..	..	2	7.0	12.0	4	33.3333	..	88
89	5	..	..	2	5.0	8.0	2	25.0000	..	89
90	3	..	..	..	3.0	6.0	1	16.6667	..	90
91	3	..	..	1	3.0	5.0	1	20.0000	..	91
92	2	..	..	..	2.0	4.0	..	00.0000	..	92
93	2	..	..	..	2.0	4.0	2	50.0000	..	93
94	2	..	..	2	2.0	2.0	2	100.0000	..	94

TABLE III.—Males and Females.

Age.	UNADJUSTED RESULTS.						ADJUSTED RESULTS.						Age.
	Number exposed to risk of Death.	Number of Deaths.	Mortality per cent. per Annum.	Number who complete the Age opposite.	Number who Die in their next Year.	Mean Duration of Life.	Mortality per cent. per Annum.	Number who complete the Age opposite.	Number who Die in their next Year.	Mean Duration of Life.	Value of Annuity at Age opposite.	Annual Premium to assure £100.	
	(1.)	(2.)	(3.)	(4.)	(5.)	(6.)	(7.)	(8.)	(9.)	(10.)	(11.)	(12.)	
10	149·5	0	0·00	..	..	..	..	..	..	..	..	..	10
11	170·0	1	0·588	..	..	..	..	..	..	..	..	..	11
12	185·0	2	1·081	..	..	..	..	..	..	..	..	..	12
13	201·5	2	0·993	..	..	..	..	..	..	..	..	..	13
14	224·5	3	1·336	..	..	..	..	..	..	..	..	..	14
15	242·5	3	1·237	..	..	..	..	..	..	..	..	..	15
16	255·0	2	0·784	..	..	..	..	..	..	..	..	..	16
17	277·0	1	0·361	..	..	..	..	..	..	..	..	..	17
18	311·5	2	0·642	..	..	..	..	..	..	..	..	..	18
19	360·5	4	1·110	..	..	..	..	..	..	..	..	..	19
20	411·0	8	1·946	9215	179	38·11	1·032	9215	95	37·99	17·410	1·586	20
21	506·0	9	1·779	9036	161	37·86	1·046	9120	95	37·39	17·295	1·619	21
22	665·0	7	1·053	8875	93	37·53	1·060	9025	96	36·77	17·176	1·655	22
23	816·5	8	0·980	8782	87	36·92	1·075	8929	96	36·16	17·055	1·692	23
24	965·5	10	1·036	8695	90	36·29	1·090	8823	96	35·59	16·951	1·725	24
25	1137·5	12	1·055	8605	90	35·66	1·106	8727	97	34·98	16·823	1·765	25
26	1291·5	9	0·697	8515	60	35·03	1·122	8630	97	34·37	16·692	1·806	26
27	1452·0	9	0·620	8455	52	34·28	1·137	8533	97	33·75	16·557	1·850	27
28	1611·5	14	0·869	8403	73	33·49	1·153	8486	97	33·13	16·417	1·896	28
29	1766·5	17	0·962	8330	80	32·78	1·169	8339	97	32·51	16·273	1·943	29
30	1954·0	16	0·819	8250	68	32·10	1·186	8242	98	31·89	16·123	1·994	30
31	2125·0	21	0·988	8182	81	31·36	1·201	8144	98	31·27	15·970	2·047	31
32	2288·0	23	1·006	8101	81	30·67	1·218	8046	98	30·64	15·811	2·103	32
33	2476·0	27	1·090	8020	88	29·97	1·235	7948	98	30·01	15·646	2·161	33
34	2640·5	35	1·325	7932	105	29·31	1·254	7850	98	29·38	15·475	2·223	34
35	2800·0	34	1·214	7827	95	28·69	1·271	7752	99	28·75	15·297	2·290	35
36	2945·0	45	1·529	7732	118	28·04	1·288	7653	99	28·11	15·115	2·359	36
37	3073·5	49	1·594	7614	121	27·47	1·306	7554	99	27·48	14·925	2·433	37
38	3229·5	50	1·548	7493	116	26·90	1·325	7455	99	26·83	14·729	2·511	38
39	3351·0	51	1·523	7377	113	26·32	1·365	7356	100	26·19	14·524	2·595	39
40	3411·5	46	1·349	7264	98	25·72	1·422	7256	103	25·54	14·313	2·685	40
41	3467·5	49	1·414	7166	101	25·08	1·481	7153	106	24·90	14·100	2·776	41
42	3521·5	50	1·420	7065	100	24·43	1·540	7047	109	24·27	13·884	2·872	42
43	3558·5	61	1·714	6965	120	23·77	1·601	6938	111	23·64	13·667	2·971	43
44	3584·5	60	1·674	6845	114	23·18	1·664	6827	114	23·02	13·444	3·077	44
45	3578·5	54	1·509	6731	102	22·56	1·731	6713	116	22·40	13·220	3·186	45
46	3536·0	68	1·923	6629	127	21·90	1·799	6597	119	21·79	12·990	3·302	46
47	3493·5	68	1·946	6502	127	21·32	1·872	6478	121	21·18	12·758	3·423	47
48	3475·0	69	1·986	6375	126	20·73	1·945	6357	124	20·57	12·521	3·549	48
49	3422·5	73	2·133	6249	133	20·14	2·023	6233	126	19·97	12·281	3·683	49
50	3322·5	58	1·746	6116	107	19·57	2·104	6107	128	19·37	12·035	3·825	50
51	3241·5	52	1·604	6009	97	18·92	2·188	5979	131	18·78	11·785	3·976	51
52	3166·5	57	1·800	5912	106	18·21	2·274	5848	133	18·18	11·531	4·134	52
53	3076·0	57	1·853	5806	108	17·54	2·364	5715	135	17·60	11·271	4·303	53
54	2981·5	81	2·717	5698	154	16·86	2·459	5580	137	17·01	11·005	4·483	54



TABLE III.—Males and Females (continued).

Age.	UNADJUSTED RESULTS.						ADJUSTED RESULTS.						Age.
	Number exposed to risk of Death.	Number of Deaths.	Mortality per cent. per Annum.	Number who complete the Age opposite.	Number who Die in their next Year.	Mean Duration of Life.	Mortality per cent. per Annum.	Number who complete the Age opposite.	Number who Die in their next Year.	Mean Duration of Life.	Value of Annuity at Age opposite.	Annual Premium to assure £100.	
	(1.)	(2.)	(3.)	(4.)	(5.)	(6.)	(7.)	(8.)	(9.)	(10.)	(11.)	(12.)	
55	2867.0	88	3.069	5544	170	16.31	2.556	5443	139	16.43	10.734	4.676	55
56	2736.5	75	2.741	5374	148	15.81	2.659	5304	141	15.84	10.456	4.882	56
57	2613.0	82	3.138	5226	164	15.24	2.763	5163	143	15.26	10.171	5.105	57
58	2497.0	78	3.124	5062	158	14.72	2.874	5020	144	14.68	9.879	5.345	58
59	2381.5	82	3.443	4904	169	14.18	3.000	4876	146	14.10	9.577	5.609	59
60	2239.5	75	3.349	4735	158	13.66	3.172	4730	150	13.52	9.268	5.892	60
61	2074.5	68	3.278	4577	150	13.12	3.419	4580	157	12.95	8.954	6.200	61
62	1901.5	80	4.207	4427	187	12.55	3.686	4423	163	12.39	8.643	6.524	62
63	1709.0	68	3.980	4240	168	12.08	3.973	4260	169	11.84	8.333	6.869	63
64	1535.0	57	3.714	4072	152	11.56	4.282	4091	175	11.31	8.024	7.235	64
65	1390.5	57	4.100	3920	160	10.98	4.616	3916	181	10.80	7.718	7.625	65
66	1265.0	53	4.190	3760	158	10.43	4.976	3735	186	10.30	7.416	8.036	66
67	1146.0	59	5.148	3602	185	9.86	5.364	3549	190	9.81	7.116	8.475	67
68	1021.0	73	7.150	3417	245	9.37	5.781	3359	194	9.34	6.820	8.942	68
69	892.0	57	6.390	3172	202	9.06	6.232	3165	197	8.88	6.527	9.439	69
70	783.5	41	5.232	2970	156	8.64	6.718	2968	199	8.43	6.239	9.968	70
71	694.0	54	7.780	2814	219	8.10	7.241	2769	200	8.00	5.955	10.531	71
72	591.0	51	8.630	2595	224	7.74	7.807	2569	200	7.59	5.675	11.134	72
73	496.5	35	7.050	2371	167	7.42	8.415	2369	199	7.19	5.400	11.779	73
74	419.5	33	7.866	2204	173	6.95	9.068	2170	197	6.80	5.131	12.464	74
75	346.5	33	9.524	2031	194	6.50	9.776	1973	193	6.43	4.870	13.190	75
76	286.5	33	11.516	1837	211	6.13	10.538	1780	188	6.07	4.613	13.970	76
77	230.5	29	12.584	1626	205	5.86	11.360	1592	181	5.73	4.365	14.793	77
78	186.0	21	11.291	1421	160	5.63	12.244	1411	173	5.40	4.121	15.681	78
79	154.0	23	14.935	1261	189	5.28	13.199	1238	163	5.08	3.885	16.624	79
80	119.0	17	14.286	1072	153	5.12	14.230	1075	153	4.78	3.653	17.645	80
81	93.5	12	12.834	919	118	4.89	15.330	922	141	4.49	3.430	..	81
82	75.5	11	14.570	801	117	4.54	16.530	781	129	4.21	3.211	..	82
83	60.5	6	9.917	684	67	4.23	17.820	652	116	3.94	3.001	..	83
84	52.5	9	17.142	617	106	3.64	19.210	536	103	3.68	2.796	..	84
85	41.0	10	24.390	511	125	3.29	20.710	433	90	3.44	2.599	..	85
86	28.0	5	17.857	386	69	3.19	22.320	343	77	3.21	2.413	..	86
87	22.0	6	27.273	317	86	2.77	24.060	266	64	3.00	2.236	..	87
88	16.0	6	37.500	231	87	2.62	25.930	202	52	2.79	2.062	..	88
89	10.0	2	20.000	144	29	2.91	27.950	150	42	2.59	1.888	..	89
90	8.0	2	25.000	115	28	2.51	30.130	108	33	2.40	1.726	..	90
91	6.0	2	33.333	87	29	2.17	32.500	75	24	2.23	1.585	..	91
92	4.0	0	..	58	0	2.00	35.010	51	18	2.05	1.425	..	92
93	4.0	2	..	58	29	1.00	37.741	33	12	1.89	1.290	..	93
94	2.0	2	..	29	..	..	40.680	21	9	1.69	1.108	..	94
95	..	..	..	..	..	..	43.851	12	5	1.58	1.017	..	95
96	..	..	..	..	..	..	47.268	7	3	1.36	.814	..	96
97	..	..	..	..	..	..	50.951	4	2	1.00	.481	..	97
98	..	..	..	..	..	..	..	2	2	.50	..	..	98

*Decimal Numeration and Decimal Coinage.* By WILLIAM THOMAS THOMSON, F.R.S.E., F.I.A.

[Read before the Institute 30th January, 1854, and ordered by the Council to be printed.]

THE Report of the Select Committee of the House of Commons on the subject of "Decimal Coinage," of 1st August 1853, sets entirely at rest any doubt or question as to the great advantages and facilities which would be afforded by the adoption of a system of decimal numeration and decimal coinage.

That the change will accordingly be made, I feel confident; and as the basis of the new arrangement, as well as the method of carrying it out, are of vast importance to the public at large, and in business generally, I have considered it a fit subject of deliberation for this Institute. It may be said that we should have taken an earlier and more prominent part in originating and promoting a change of system, of the importance of which we had individually, I may safely assume, been long convinced; but I am inclined to think that we have wisely reserved our opinions, and that they will be more valuable in the present stage of the discussion (now that the Report of the Select Committee, and the evidence taken before them, has been published), than they would have been earlier in the day. And as practical actuaries, I hope we may be considered qualified to offer sound opinions and advice on this very important question, seeing that we are accustomed daily to work calculations by decimal fractions, converting and reconverting them to and from the timeworn *librae*, *solidi*, and *denarii* of our present accounts, and that we are in daily contact with all classes of men in matters of accounting and finance.

I shall not detain you with any lengthened account of the origin and progress of the decimal system; but it may be instructive to some who have not turned their attention to the matter, to learn concisely what is recorded on the subject.

After various progressive changes, "a mighty stride was made in numerical notation by the Greeks, when they distributed the 24 letters of their alphabet into three classes, corresponding to units, tens, and hundreds. To complete the symbols for all the nine digits, an additional appropriate character was introduced in each class." The Greek notation proceeded directly as far as 999; but there were marks or signs which augmented the values one-thousandfold, ten-thousandfold, and so on. Archimedes, Apollonius, and Ptolemy, made important steps in advance, and the latter

invented and applied the sexagesimal scale. "The arithmetic of the Greeks, thus successively moulded by the ingenuity of their great geometers, had attained a singular degree of perfection, and was capable, notwithstanding its cumbrous structure, of performing operations of very considerable difficulty and magnitude. But those masters of science, rich in their mental resources, overlooked the advantages resulting from a simpler mode of arrangement. They had only to ascend more slowly, and proceed by tens instead of periods of myriads; that is, to retain as numerals no more than the first set of their alphabetic characters, which were already employed with a point or short dash, subscribed to denote thousands. This might seem an easy step in the progress of invention, but the current of ideas had already flowed beyond it."\*

The Romans derived their knowledge of numerical notation and "palpable arithmetic" from the Greeks; and a denary scale of numeration, or rather of coinage, it has been stated, on the authority of Pliny, can be traced back to the year 266 B.C., when silver money was first coined in Rome.† "The denarius, the chief silver coin down to the time of Constantine, was so termed from its being equivalent to ten asses or ten lbs. of brass (*deni æris*); although, in consequence of the scarcity of silver after the second Punic war, it was declared equivalent to sixteen asses. Then came the division of the denaria into sestertii (the moneys of account were sestertius and sestertium), one sestertius representing the hundredth part of the ordinary gold coin of Rome, the denarius aureus; the latter, however, not having been coined until sixty-two years after the silver denarius (204 years B.C.). The convenience of the sestertius must soon have been discovered; for in all matters of account, the reckoning was by sestertii, notwithstanding that the coin used in making payments was generally the denarius. The sestertius formed the unit of account, and was indifferently expressed as sestertius, sestertius nummus, or simply nummus."‡ One thousand of these made the sestertium, and one thousand sestertia made the denis sestertium.

I am inclined, however, to trace another stream to the fountain head, as more likely to lead to the source from which the true

\* Leslie's *Philosophy of Arithmetic*.

† We are told by Pliny, upon the authority of Timæus, an ancient historian, that till the time of Servius Tullius the Romans had no coined money, but made use of unstamped bars of copper, to purchase whatever they had occasion for.

‡ This statement I have taken from the Report on the subject of Decimal Coinage, by the Edinburgh Chamber of Commerce, in consequence of its succinctness; but the articles 'Denarius' and 'Sestertius,' in any of the Encyclopædias, will give more precise information on the subject to those who desire it.

decimal system, *in conjunction with the principle of local value*, was introduced to Europe.

There is no doubt that the Hindoos have long used it; and it is easy, I am informed, to trace the manner in which our numeral symbols have been derived from those of the Sanscrit, in which language there are distinct names for units, tens, &c., up to what we would call hundreds of thousands of millions of millions. That the Persians and Arabs, by whom it was called "Hindoo science," derived it from the Hindoos, seems equally certain; and the date of their acquiring that knowledge appears to have been between the ninth and twelfth centuries. There are three accounts as to the introduction of digital arithmetic with Arabic numerals into Europe—one, that Gerbert, who was afterwards Pope Sylvester II., found it in Spain among the Moors in the latter part of the tenth century, and introduced it into France; another, that Leonard of Pisa introduced it in 1202, in a work entitled *Liber Abbaci*; and a third, that the *Alonsine Tables*, being constructed principally by Moors at the Court of Alonso, King of Castile, must have been the first instance in which the system appeared.

As regards our present system of pounds, shillings, and pence, it appears to have been introduced into England previously to the invasion of William the Conqueror; but it lays claim also to antiquity, for it is possible, I believe, to trace the origin of such division to the reign of Charlemagne, who introduced the Roman pound to modern Europe—this pound or *livre* (which consisted of a pound weight of pure silver) being coined into twenty sous or sols, the sou being again divided into twelve deniers, which corresponds with our present system.

I shall not, however, detain you with any speculation in these matters of history, curious though they be, but step at once to the period when the Arabic symbols displaced the Roman symbols from accounts in this country, and for the first time introduced a decimal mode of numeration, distinguished from the Greek and Roman systems by the system of "local value," which characterizes the Arabic.

It has been remarked by Peacock, whose valuable history of arithmetic most of you have probably seen or heard of, that the natural scales of numeration alone can and must prevail, and to prove this I feel almost tempted to digress for the purpose of explaining and considering the effect of the various scales as compared with the denary or decimal; but I must confine myself strictly now to the decimal system.\*

\* The article 'Arithmetic,' in the supplement to the *Encyclopædia Britannica*, contains a very full analysis of these different scales.

The following observations on the value of the Arabic numeral and its decimal arrangements, express very concisely the importance of the system.

"We find ourselves in possession of a method of representing numbers so simple and powerful, that the principle and practice of the most complicated rules follow from it with ease. It is so well known that we need not explain it; but when we separate from the rest the part which particularly distinguishes our numeration from that of the ancient Europeans, we shall find that our superiority consists in the following :—"

"1st. The value of a figure depends not only upon the simple numbers for which it stands when alone, but on the *place* in which it stands. Thus, in 888, the three eights mean, eight, eight tens, and eight hundreds.

"2d. The place of a figure, considered as affecting its value, is determined by the column in which it stands; and in the absence of succeeding figures to indicate the existence of other columns, their place is supplied by cyphers, which of themselves are considered as having no value. Thus, the value of 8 in 800 is the same as the 8 in 863."

The use of Arabic numerals certainly preceded the invention of printing; but on referring to the works of the early printers, 400 years ago, we do not find the use of the Arabic numerals except occasionally in dates, or such exceptional instances in which we at the present day use the Roman numerals. In the works of Caxton, for example, I am informed that they only appear in a woodcut, till 1480, when he printed the *Mirroure of the World*. Indeed, it was not till the sixteenth century that they came at all into general use. The year "1375," one of the oldest authentic dates in Arabic numerals, is written by Petrarch in a copy of St. Augustine. In 1390 a little tract, published in Germany, *De Algorismo*, explains the digital notation and elementary rules of arithmetic. A curious almanack, written on vellum, is preserved in the library of the University of Edinburgh, calculated for 1482, the numerals given in which closely resemble those used by Caxton. The college accounts in the English Universities were kept in Roman numerals till the early part of the sixteenth century. The change in the parish registers did not take place till 1600. In Scotland the oldest date to be met with is 1490, which occurs in the rent-roll of the diocese of St. Andrews.†

As a matter of curiosity, I now lay on the table for inspection the work of Peele, published in 1569, intituled "*The Pathewaye to*

\* It can scarcely be said that the principle of local value prevails throughout the Roman system; but it will be remarked that a smaller symbol before a larger one, in numbers less than 100, denotes a subtraction; after it, an addition—IV=5—1=4. VI=5+1=6. IX=10—1=9. XI=10+1=11.

† See Leslie's *Philosophy of Arithmetic*—a book I cannot too strongly recommend to the student. It is now very scarce, and should be reprinted. The substance of it will be found in the article 'Arithmetic,' in the supplement to the *Encyclopædia Britannica*.

*Perfectnes* in th' Accomptes of Debitour and Creditour in manner of a Dialogue. Very pleasaunte and profitable for Marchauntes and all other that mind to frequent the same; once agayne set forth and very much enlarged. By James Peele, Citizen and Salter of London, Clercke of Christes Hospitall, Practizer and Teacher of the same. Imprinted at London in Paules Church-Yarde. By Thomas Purfoote, dwellinge at the signe of the Lucrece, 16 August 1569."

In this work, which I believe was the first book published in this country on book-keeping by double entry, and to which Professor De Morgan refers in his *Arithmetical Books* as not having seen, but which he informs me he afterwards saw and purchased, or recommended to be purchased, for the British Museum—in this curious old book, it will be found that the journal is kept in Roman numerals and the ledger in Arabic numerals, showing the transition state from one to the other, the Roman being retained in the journal in consequence of not requiring to be added.

It is now the proper time to observe that the decimal arrangement of whole numbers was discovered before the system of decimal fractions. We have hitherto treated of the *gradus ascendentes*, and we must now shortly consider the *gradus descendentes*. It seems very extraordinary that this extension of the system, flowing so naturally from the principle of decimal division, should not have been adopted by the Hindoos. They write fractions, I understand, as we do, only omitting the line which separates the numerators and denominators; but they make no use of decimal fractions, except in some peculiar manner, without any peculiarity of notation in approximating to the square roots of numbers.

The Chinese are understood to have employed the descending terms of the denary scale for a very long period; and, as regards other sources, it would appear that decimal fractions were used by Ramus in his *Arithmetic*, written in 1530, and previously by Buckley and Recorde. Simon Stevinus also wrote an express treatise on decimals in 1582, *La Practique d'Arithmetique*; but we may trace the first introduction of them probably to Regiomontanus, who, about the year 1464, transformed the tables of Sines from a sexagesimal to a decimal scale. The sexagesimal scale was invented by Claudius Ptolemæus, about the year of Christ 200.

Since the fifteenth century, then, when the Arabic numeral and system of local value was introduced, the only material addition which has been made to our arithmetical system has been that of

decimal fractions; but their use has been confined to scientific and professional men. As regards improvement in numeration, in the keeping of accounts, and the arrangement of our coinage, we have certainly stood still for upwards of 300 years.

The evidence taken before the Select Committee has now, I am glad to say, introduced the subject of reform to the public mind, with the view of establishing a decimal system of accounts and coinage in this country; and I really hope the time is not far distant when we shall accomplish important changes in our system, and that not only as regards accounts and coinage, but weights and measures also.

The Committee of last session, in summing up the evidence on the subject taken before them, make the following statement:—

“All the witnesses examined by your Committee concur in the opinion that great advantages attach to a decimal system, as compared with the present system of calculation; and the only points on which any difference of opinion was expressed by them relate to the precise basis which should be adopted, and the practical measures to be employed for introducing the decimal system, so as to produce the least amount of temporary inconvenience, and the smallest extent of unwillingness to encounter the change, on the part of the classes who are the most likely to be affected by it.

“With regard to the inconveniences of the existing system, the evidence is clear and decided. That system is shown to entail a vast amount of unnecessary labour and great liability to error, to render accounts needlessly complicated, to confuse questions of foreign exchanges, and to be otherwise inconvenient.

“On the other hand, the concurrent testimony of the various witnesses is to the effect that the adoption of a decimal system would lead to greater accuracy, would simplify accounts, would greatly diminish the labour of calculations (to the extent of one half, and in some cases four fifths, according to Professor De Morgan, who has made the question his especial study); and, by facilitating the comparison between the coinage of this country and other countries that have adopted the decimal system, would tend to the convenience of all those who are engaged in exchange operations, of travellers and others. An important benefit would be derived in several departments of the public service, and in every branch of industry, from the economy of skilled labour which would result from the proposed change, at the same time that the education of the people generally would be much facilitated by the introduction into our schools of a system so directly calculated to render easy the acquirement of arithmetic.”

With these strong expressions and opinions before you, which are stated in even stronger language by the witnesses themselves, I shall not dwell on the advantages of the change, but, holding these proved, at once proceed to consider the basis from which a decimal system of accounts and coinage should proceed, and the best method to be pursued in introducing it.

There have been suggested, as far as my observation has extended, eight plans :—

The £1 or Sovereign Unit.

The 10s. or Ducat Unit.

The 2s. or Florin Unit.

The 1s. Unit.

The 4s. 2d. or Dollar Unit.

The 10d. or Franc Unit.

The Penny Unit.

The Farthing Unit.

It will be perceived that the farthing and penny (it is presumed it is not proposed to make a decimal division of the penny) are the only units suggested in connection with which it is possible to proceed upwards from the lowest denomination; but as it is not probable that any person would keep their accounts in farthings or pennies, let us, instead of calling it the farthing unit, call it the £1. 0s. 10d. unit (that is, 1,000 farthings), and, instead of calling it the penny unit, let us call it the 8s. 4d. unit (that is, 100 pence). This arrangement will enable us to treat the whole as if they proceeded downwards, and the following table will show the decimal divisions:—

Units.	1st Decimal Division.	2nd Decimal Division.	3rd Decimal Division.
£1	2s.	$2\frac{4}{10}d.$	$\frac{6}{25}$ of 1d.
10s.	1s.	$1\frac{2}{10}d.$	$\frac{3}{25}$ of 1d.
2s.	$2\frac{4}{10}d.$	$\frac{6}{25}$ of 1d.	..
1s.	$1\frac{2}{10}d.$	$\frac{3}{25}$ of 1d.	..
4s. 2d.	5d.	$\frac{1}{2}d.$	..
10d.	1d.	..	..
1d. or 8s. 4d.	10d.	1d.	..
Farthing, or } £1. 0s. 10d. }	2s. 1d.	$2\frac{1}{2}d.$	1 farthing.

These plans did not all come before the Committee with support, but they have each of them their supporters otherwise. Let us examine them separately.

#### THE £1 UNIT.

This unit has the recommendation of the Committee, and among the witnesses who gave evidence it had a large majority in its favour. The Committee thus express themselves :—

“Your Committee have no hesitation in recommending the present pound sterling. Considering that the pound is the present standard, and therefore associated with all our ideas of money value, and that it is the basis on which all our exchange transactions with the whole world rest, it appears to your Committee that any alteration of it would lead to infinite complication and embarrassment in our commercial dealings; in addition to which it fortunately happens, that its retention would afford the means of introducing the decimal system with the minimum of change. Its tenth part already exists in the shape of the florin or 2-shilling piece, while an alteration of four per cent. in the present farthing will serve to convert that



coin into the lowest step of the decimal scale which it is necessary to represent by means of an actual coin, viz., the thousandth part of a pound. To this lowest denomination your Committee propose, in order to mark its relation to the unit of value, to give the name of mill. The addition of a coin to be called a cent, of the value of ten mills, and equal to the hundredth part of the £1, or the tenth part of the florin, would serve to complete the list of coins necessary to represent the moneys of account, which would accordingly be pounds, florins, cents, and mills."

#### THE 10s. OR DUCAT UNIT.

This unit has many testimonials in its favour throughout the evidence, and the cross-questioning generally brings out the admission that its subdivisions are better than the £1 unit. I shall enlarge on its advantages afterwards.

#### THE 2s. OR FLORIN UNIT.

This unit would be no improvement on the £1 unit. £1 would become ten florins, and the cents and mills would descend from the florins. As it assumes a silver monetary standard which all our greatest authorities repudiate in our existing position, however much they might consider such a standard or a mixed standard desirable, I shall not dwell on this proposal. Sir J. Herschel's opinion as to this unit is as follows:—

"Next comes the florin system, which would reckon all in florins and cents of florins. This makes the pound a natural decimal multiple; and so far, good. But it assumes a silver monetary standard; whereas, for good or for evil, for better for worse, we are married to a gold one. I do not mean to say a silver standard would not be better. I believe it would, and I believe a binary standard, half silver, half gold, at the option of either party to insist on, would be better than either; but gold is our standard of value, and we are lashed on to it, and must be carried along with it, toss as it may."

#### THE 1s. UNIT.

This I hold to be the same as the 10s. unit, with the same objections as apply to the florin, as regards a silver monetary standard. Sir J. Herschel disposes of this unit in the following manner:—

"Then comes the shilling system. It has no one point to recommend it but its copper dime. The sovereign must be called a 20-shilling piece; the penny must be demonetised; and we are landed in a system having no relation to any other, in Europe or elsewhere."

#### THE 4s. 2d. OR DOLLAR UNIT, AND THE 10d. OR FRANC UNIT.

These units I shall take together. I consider them highly objectionable, not only for the reasons as to a silver standard

referred to in the case of the florin, but for other reasons.\* As I understand it, the proposal for their adoption is founded on some imaginary theory of assimilating the coinage of the world; but although the world may some day have a universal religion, a universal alphabet and language, the same code of laws, and work entirely in concert, I think we had better legislate for ourselves in the meantime, avoiding the creation of confusion at home by the alteration in value of all our higher coins and notions of value by the introduction of such a system.

I do not mean to detract from the value of the French and American systems, to which the adoption of one or other of these units would allow us to assimilate. I have had experience of both to a limited extent when visiting these countries, and found them simple, and I have no doubt that the calculating powers of our transatlantic brethren have been sharpened by the decimal system; but I see no reason for the proposed assimilation.

The franc system would allow you to retain our present penny unaltered in value; but that advantage would be dearly bought, by the utter confusion which would be created in our notions of value by its adoption, as all our accounts would require to be kept in francs. The dollar would allow the retention of the halfpenny, but it is open to the same objection as the franc.

The following question, put to Professor Airey, and his answer, bears upon coinage, as well as weights and measures. It may be in somewhat different degrees, but still the general effect is similar:—

“482. Do you think a uniform system throughout the world would be a great advantage?—Not so much as would at first sight appear. I suppose of the 20,000,000 of people in England, that not 10,000 have anything to do with the weights of foreign countries; and it is far more important to make the relations among themselves certain and convenient.”

#### THE PENNY UNIT.

This is a mere shifting of the proposal for the adoption of the franc unit. In the words of Sir J. Herschel—

“It would give us a franc not very far from the French, and a pound of 200 pence, which was the old Saxon pound of Ethelbert. I took occasion not very long ago to suggest this for a Canadian pound, but it is quite visionary as applied to England.”

I admit that, if the penny could be retained unaltered, a great point would be gained; but it is *impracticable*.

\* It has been suggested that the 4s. 2d., or dollar, might be made a gold coin; but those persons who have seen, and still more, those who have used, the American gold dollar, will agree with me in considering it a most inconvenient coin.—See evidence.

THE FARTHING UNIT.

This unit has been supported by one witness (Mr. Headlam), and the Committee have thought it right to allude to it as the system promoting the greatest amount of advantage after the £1, in the following words :—

“The large number of payments which are now expressed in pence would remain unaltered, and a great portion of those daily transactions in which the mass of the population are engaged would be unaffected by the change; but when it is considered that the adoption of that alternative would, by adding ten pence to the value of the present pound, and a half-penny to that of the shilling, necessitate the withdrawal of the whole of the present gold coinage, and nearly the whole of the silver, and involve the alteration of the terms of all contracts and obligations expressed in coin of either of the latter metals, your Committee would not feel themselves warranted in recommending the adoption of such a proposal.”

It has been suggested by one ingenious writer on the subject,\* that the depreciation of gold, and the increasing value of silver, call for an increase in value of the silver coins, which the farthing unit gives the opportunity of making; but an increase of a half-penny in the shilling or ten pence in the pound may or may not measure the expected depreciation; “for,” in the words of the Committee who reported on Mr. Alexander’s paper, “as it is quite impossible to predict the extent to which the value of silver may alter, it is equally impossible to say whether, after any assigned period, the intrinsic value of the present shilling would be an exact decimal of the existing gold sovereigns” or of £1. 0s. 10d. (the proposed “new guinea” of the writer), or of any other assumed gold coin. But farewell to our prospects of obtaining a decimal system, if we mix up with it the difficult questions which a consideration of the currency gives rise to.

One writer has suggested the coinage of a franc piece, and pieces corresponding to its divisions, which, with the existing gold and silver coins, would make up the difference which the adoption of the farthing unit would create in the higher coins; but, in my opinion, that plan would be still more objectionable and confusing than an entire change.

The following is Professor De Morgan’s opinion as to the farthing unit, taken from the evidence :—

“730. Another suggestion has been to keep the farthings, but to change the other coins?—That, I think, would give more trouble altogether than the other change; it would give a great deal of trouble in large commercial transactions.

\* A paper read before the Royal Society of Arts in Scotland, December, 1853, by Mr. James Alexander.

"731. Would it effect a complete change of the ideas of money?—Yes; it would alter the exchanges—that is, the names under which exchanges are expressed. It would give the commercial world a great deal of trouble, and I do not see that it would be compensated by any advantages. There was a proposal made, when this present silver coinage was introduced (I think in 1816), for a decimal coinage, that we should take the guinea at 252 pence, and convert that into 1000 mils—that is to say, the 252 pence into 250 pence—which was advocated as the least violent change in the copper; but it found no acceptance, and of late years it has never been revived."

I entirely agree with Professor De Morgan.

After these remarks, I shall now limit my further observations to the £1 *unit*, and 10s. *unit*; declaring myself at once an advocate for the 10s. unit.

I shall endeavour to give my reasons for this conviction.

To the £1 unit I object, on the ground that it gives coins of account of the most unuseable description. A *florin* is of itself comparatively the price of few articles—it will always continue to be looked on as a double shilling; and if it is to be a money of account under the decimal system, must be recalled, to be *again* re-issued, so as to be marked in a manner intelligible to the people, and divested of its Gothic letters.\* I may further observe, that two millions only of these coins were in circulation at the date of the evidence, while there were thirty-seven millions of halfcrowns in the hands of the public, which would require to be called in, in the event of the adoption of the £1 unit. These coins could not be allowed to exist permanently together without confusion of which the Committee were fully aware; but during the transition state, the period of greatest difficulty, they must circulate simultaneously, as the thirty-seven millions of halfcrowns cannot be withdrawn except by slow degrees. This will increase the difficulty of introducing the change; for even now the confusion between these coins, with the small number of florins in circulation, is very great, and I myself have witnessed intelligent persons unable to judge whether a florin or halfcrown had been given them.

The *tenth* of a florin, and hundredth of £1, becomes  $2\frac{1}{2}d$ , the proposed cent—too large for a copper coin, and too small for a silver one; for even our present threepenny piece is apt to slip through our fingers. Pieces of a penny and twopence, in copper, were coined in the reign of George III. The latter (two pennies) did not answer their purpose, and were soon discontinued. It has

\* The florin has already been twice issued, having been recalled in consequence of the omission of the letters "D. F." The two sets are of different sizes.

been suggested that a coin of mixed metal should be issued; but Mr. Thomas Hankey, junior, and other witnesses, object to such a plan most strongly. Another suggestion is, that a small silver coin with a copper rim should be introduced; but I find that in 1684 tin farthings were coined with a stud of copper in the centre. Half-pennies of the same metals were struck by James II. and William and Mary; but in 1693 the tin was called in, and the copper renewed.

The *tenth of a cent*, or mill, becomes a near approach to our present farthing; but a binary division is here required to give the half-farthing or halfmill. No doubt, the half-farthing is ignored by the shopkeepers who were examined; but I have no doubt they have their reasons for such opinion, while their evidence all proceeds on their past experience—which, in my humble opinion, does not lead to the conclusion that, although a half-farthing may not be wanted at present, it will not be very useful under a decimal system.

But I would further observe generally, that a binary division is required of all the coins under the £1 unit system, to make them intelligible to the mass in a transition state.

The retention of the £1 in our accounts in all its integrity is considered an equivalent, then, or rather a sufficient compensation, for the confusion which the introduction of the florin, cent, and mill of the above-mentioned values would create; but I cannot imagine that the Government will attempt this. How would it be possible, for instance, in writing down 8·124 (8 pounds, 1 florin, 2 cents, 4 mills), to make it intelligible to a working man, or even one higher in the social scale, that 1 (the first decimal figure) means 2 shillings (for we shall still for some time count in shillings); that 2 (the second decimal figure) means two tenths of two shillings; and that 4 (the third decimal figure) means four hundredths of two shillings, or four thousandths of one pound? It may be replied that the idea of old coins will be dispelled; but I would humbly say, not so, even among the educated; and we must retain the shilling (old solidus) in as far as possible his old place, otherwise we shall get into inextricable confusion. Will not the alteration of pence under a 10s. unit produce the same confusion? I am asked; but I answer, no. The shilling is the poor man's measure, "the poor man's unit" (*see* evidence), as well as the rich; and he will soon learn that ten new copper cents make a shilling, while he will be long in discovering the subdivisions of a florin.

Another unanswerable objection to the £1 unit is that it will force bankers, merchants, and others to adopt a fourth column in

their accounts, or to reject from them the representation of all sums below a cent that is below  $2\frac{4}{10}d.$  At present, all values below a penny are denied representation in business books, so that accounts are kept in pounds, shillings, and pence ; but under the pound unit accounts must be kept in pounds, florins, cents, and mills, or we must ignore any sum below  $2\frac{4}{10}d.$

Without dwelling longer on the £1 unit system, I shall proceed to set forth the advantages of a 10s. unit, of which I have been thoroughly convinced throughout.

The 10s. unit would enable us to retain the shilling as a coin of account, being the first decimal of the unit. The tenth of a shilling becomes  $1\frac{2}{10}d.$ —a convenient coin, which need not exceed in size the present rimmed penny, while the tenth of a penny gives very nearly our present half-farthing.

The 10s. scale would run thus—the first decimal of the unit always corresponding with the existing shilling:—

$\frac{1}{10}$ th of 10s., or ducat—that is, 1 shilling	=	·1
2    "	=	·2
3    "	=	·3
4    "	=	·4
5    "	=	·5
6    "	=	·6
7    "	=	·7
8    "	=	·8
9    "	=	·9
10   "	=	1.

$\frac{1}{10}$ th of 1s., or 1 cent	=	$1\frac{2}{10}d.$	=	·01
2    "	=	$2\frac{4}{10}d.$	=	·02
3    "	=	$3\frac{6}{10}d.$	=	·03
4    "	=	$4\frac{8}{10}d.$	=	·04
5    "	=	6d.	=	·05
6    "	=	$7\frac{2}{10}d.$	=	·06
7    "	=	$8\frac{4}{10}d.$	=	·07
8    "	=	$9\frac{6}{10}d.$	=	·08
9    "	=	$10\frac{8}{10}d.$	=	·09
10   "	=	12d.	=	·10

$\frac{1}{10}$ th of $1\frac{2}{10}d.$ , or 1 mill, = $\frac{3}{25}$ ths of 1d., or $\frac{2}{5}$ ths of half a farthing	}	=	·001
2 mills, or $\frac{2}{5}$ ths of a penny, and $\frac{2}{5}$ ths of a farthing		=	·002
3 mills, or $\frac{3}{5}$ ths of a penny	}	=	·003
4 mills, or $\frac{4}{5}$ ths of a penny, or $\frac{2}{5}$ ths of a halfpenny		=	·004
5 mills, or $\frac{1}{2}$ ths of a penny	.	=	·005
6 mills, or $\frac{3}{4}$ ths of a penny	.	=	·006
7 mills, or $\frac{7}{4}$ ths of a penny	.	=	·007

8 mills, or $\frac{2}{3}$ ths of a penny	.	.	.	=	·008
9 mills, or $\frac{2}{3}$ ths of a penny	.	.	.	=	·009
10 mills, or cent, $\frac{3}{4}$ ths of a penny,	=	$1\frac{2}{10}$	=		·010

Now observe this scale—the 1s. remains as at present up to 9s., and may be kept in a column by itself. 10s. make a ducat, or whatever the authorities may choose to call it; rejecting, however, I would suggest, the name ‘pound’ or ‘decimal pound,’ as the sovereign will still be called £1 or double ducat. Mark the ease with which the cents and mills under this unit accommodate themselves to our present coinage:—

5 cents make 6d.;  
2 cents and 5 mills make 3d.;

enabling us to let these coins circulate during the change; and, in fact, only rendering it necessary to withdraw the fourpenny piece. Again, 8 mills approach within 1-25th, or 4 per cent., of 1d., and 4 mills, 2 mills, and 1 mill give you nearly our present halfpenny, farthing, and half-farthing.

We now arrive at the point at which the Gordian knot must be cut; for, whether the 10s. unit or the £1 unit be adopted, our copper coinage must all be depreciated by 4 per cent. It would thus be necessary to make it understood by proclamation under the ducat or 10s. system, that

8 mills make an old penny.  
4 „ „ an old halfpenny.  
2 „ „ an old farthing.  
1 „ „ an old half-farthing.

Also, that 10 mills make a cent, of which 10 go to the shilling.

That 12 old pennies, or 96 mills, with 4 mills or a halfpenny added (100 mills in all), go to the shilling.

That 6 old pennies, or 48 mills, with 2 mills or a farthing added (50 mills in all), go to the sixpence.

That 3 old pennies, or 24 mills, with 1 mill or half a farthing added (25 mills in all), go to the threepence.

If a person should take change for 1s., in the existing copper coins, there will be an apparent gain of a halfpenny; but to a person asking 1s. for copper, there would be an apparent loss. This would of course be the same under the £1 system; but I have no doubt the real value of the coins under the change would become apparent to all very soon; and by gradually withdrawing the 6d., 3d., and copper coinage, substituting 5 and  $2\frac{1}{2}$  cent pieces, also 1 mill, 2, 4, 8, and 10 mill pieces, the system would be completed, and I have no doubt the transfer would be easy.

It may be replied, that in this way the public will still continue to count in pence, and will not adopt the decimal values; and so

they will for a time; but I beg you to recollect, that the labouring man and the poor man keep no accounts, and when a man is far enough on in the world to keep books he will soon learn the new system, with tables at his hand showing the value in cents and mills of any sum he may receive in the old coinage.

I entertained at one time the same difficulty which Professor De Morgan has done as to the adoption of the words 'cents' and 'mills,' as in a complete decimal system everything must have its tenths, thousandths, &c., which might render it inexpedient to apply these terms to money, as if they belonged to money alone; but after deliberation, and in consideration that the terms 'pence' and 'farthings' must ultimately be given up, and new names adopted, also considering that it is still proposed to retain the word 'pound,' which has heretofore been common to moneys and weights and measures, I have got over the difficulty as far as it presented itself to my mind, and do not now think it will retard or confuse the new system.

The coins under the 10s. unit would be as follows:—

*Sovereign*, or double ducat.

Ducat, or 10s. (unit).

Five-shilling pieces, if wanted.

Halfcrown.

Shilling.

Five-cent piece, which, as pence are to be abolished, I would in future call a "silver half," equal in value to an old sixpence.

$2\frac{1}{2}$ -cent piece, or "silver quarter," equal in value to an old threepenny piece.

1-cent piece, 10 mills.

8 mills (old penny).

4 mills (old halfpenny).

2 mills (old farthing).

1 mill (old half-farthing).

And, as it would be advantageous in stamping coins to have reference to both ends of the system, decimals of a ducat and number of mills, I would therefore stamp each new coin accordingly. For example,

1s. would also be 10 cents, or 100 mills.

1 cent would be 100th of a ducat, one tenth of a shilling, or 10 mills; and so on.

I have now to meet the only point of difficulty in the system I advocate, namely, the representation of accounts in ducats of 10s., thus "confusing all our ideas of value," as alleged in the evidence; and I beg it may be remarked that this alleged confusion is the only point of difficulty stated by the witnesses to the adoption of



the 10s. unit. The answers by Sir J. Herschel and Professor De Morgan on the subject may be taken as an example of the whole.

Sir J. Herschel's evidence :—

"There is, first, the ducat system, which takes the halfpound as its unit. I call it the ducat system; some speak of royals; some of Victorias; it is no matter, provided only it is not called a pound—for if you call it a pound, all manner of objections apply to it, for which I refer to Mr. Hankey's evidence.

"This has some very taking points. It preserves the shilling as the silver unit—the *poor man's unit*, as it has been called; it requires only doubling to change pounds into ducats. It would admit of a copper coin to represent its tenth part, a copper cent, which is a real advantage.

"On the other hand, it has, in my opinion, fatal objections. It would double the *numerical* announcement of debts, taxes, liabilities of all kinds, rents, and prices; but what is of more real consequence, and is in my mind unanswerable, is that the bulk of our gold circulation cannot possibly consist of 10-shilling pieces. It is impossible to coin enough of them in a given time to meet emergencies. Now the bulk of your gold coinage must consist of your gold unit. It would never do to have the one great element of all our reckonings thinly scattered among larger pieces as our halfsovereigns are now among the sovereigns. It would be, in short, a mere money of account."

Professor De Morgan's evidence :—

"783. Supposing you were to adopt the unit of 10s., and divide it into 1000 parts, would that afford a greater facility in keeping accounts?—Neither more nor less. Arithmetically speaking, it is a matter of no consequence.

"784. Our present accounts being kept in pounds, shillings, pence, and farthings, would it not be an advantage if we could still keep our accounts in pounds, shillings, pence, and mills?—The suggestion being to retain the 10s. as our principal coin of account, to be divided into 1000 parts, the tenth part being 1s., the advantage is, that we keep a well known coin, the shilling, as one of our great coins of account, but the disadvantage I have spoken of before, viz., the destruction of all our associations connected with the pound, and the alteration in a coin which is known all over the world."

Now I am inclined to think, that although we adopt a decimal system, it does not follow that all our books and public accounts must be kept in a manner exactly to correspond with the ducat, or that we must express ourselves in ducats. Is it not very easy to call 200 ducats £100, and, even if we keep our books in ducats, to give our results in pounds, at least till we become accustomed to the change? Or, why not keep our accounts as at present, as regards pounds and shillings, changing the pence and farthings into cents and mills—converting the pounds into ducats only when required for use, in calculation or otherwise? Nothing can be simpler—thus :

£	Sh.	Cts.	Mills.			Ducats.	Sh.	Cts.	Mills.
28	14	5	2	}	or	57	4	5	2
16	17	6	4			33	7	6	4
19	9	5	8			38	9	5	8
<hr/>						<hr/>			
65	1	7	2	=		130	1	7	2*

I think the plan suggested should get over the only difficulty started as to the 10s. unit, and which has been made so much of, on the ground of its altering all our notions of existing accounts and values.

I do not see the force of Sir J. Herschel's objection, that "the bulk of our gold circulation cannot possibly consist of 10s. pieces." There is no occasion that it should. The sovereign or double ducat may still keep its place, although not itself the unit.

I have little more to add. In the evidence, and in the different pamphlets which have been published, considerable space is taken up with suggestions and discussions as to the effect of making the penny 4 mills or 5 mills under the £1 unit, and 8 mills or 9 mills under the 10s. unit, with reference to the loss or gain to the revenue by the change, in connection with postage stamps, receipt stamps, pontages, &c.; but I do not think it necessary to enter on these points—"all rates fixed by Government can be altered by Government;" and as there is at present a net surplus revenue or profit in the Post Office department of nearly one million per annum, the postage question need not surely be one of much difficulty. The stamp question, looking to the recent changes, should also be easily disposed of; and the income tax, at its present rate, might be made 3 per cent., giving a small advantage to the Government. If private interests stand in the way, let a Government Commission settle the loss by compensation in each individual case, taking the amount out of the revenue, or specially assessing the country for it. Surely so great and important a change is worthy of special legislation.

#### AIDS TO CALCULATION.

In consequence of the reference made by Professor De Morgan and Dr. Bowring in their evidence to different aids to calculation, I have thought it might be interesting to the Institute, before concluding, to receive some further explanation as to the shwan-pan of the Chinese, and other similar instruments. The following description of the "abacus" is taken partly from Hutton's *Mathe-*

\* Those who do not wish to introduce mills into their accounts, can reject them as at present, making  $1\frac{2}{5}$ d. of present money the lowest represented value, which assimilates very closely to present practice, and gives a practical advantage over the £1 unit.

*matical Dictionary*, and partly from Leslie's *Philosophy of Arithmetic*.

'ABACUS' (in Arithmetic), an ancient instrument used by most nations for casting up accounts, or performing arithmetical calculations; it is by some derived from the Greek  $\alpha\beta\alpha\chi$ , which signifies a cupboard or beaufet, perhaps from the similarity of the form of this instrument; and by others it is derived from the Phœnician *abak*, which signifies dust or powder, because it was said that this instrument was sometimes made of a square board or tablet, which was powdered over with fine sand or dust, in which were traced the figures or characters used in making calculations, which could thence be easily defaced, and the abacus refitted for use. But Lucas Pacioli, in the first part of his second distinction, thinks it is a corruption of *Arabicus*, by which he meant their algorism, or the method of numeral computation received from them.

We find this instrument for computation in use, under some variations, with most nations, as the Greeks, Romans, Germans, French, Chinese, &c.

The *Grecian* abacus was an oblong frame, over which were stretched several brass wires, strung with little ivory balls, like the beads of a necklace, by the various arrangements of which all kinds of computations were easily made.

The *Roman* abacus was a little varied from the Grecian, having pins sliding in grooves, instead of strings, or wires and beads. The abacus or *tabula logistica*, with its furniture, is frequently mentioned in the classics.

"Quo pueri magnis e centurionibus orti,  
Lævo suspensi loculos tabulamque lacerto."

HOR. SAT. I. vi. 73.

For the purpose of elementary education, this table or board was strewn with sand:

"Nec qui abaco numeros et secto in pulvere metas  
Scit risiase vafer."

PERS. SAT. I. 132.

The sand used was, according to Martianus Capella, of a sea-green colour:

"Sic abacum perstare jubet sic tegmine glauco  
Pandere pulvereum formarum ductibus æquor."

LIB. vii. De Arithmetica.

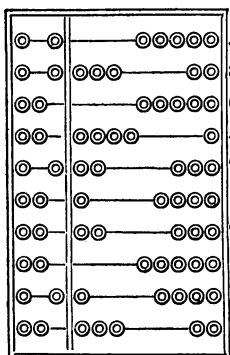
The *Chinese* abacus or shwan-pan, like the Grecian, consists of several series of beads strung on brass wires, stretched from the top to the bottom of the instrument, and divided in the middle by a cross piece from side to side.

In the upper space every string has *two* beads, which are each

counted for 5; and in the lower space every string has 5 beads of different values, the first being counted as *one*, the second as 10, the third as 100, and so on, as with us.

(Mr. Thomson exhibited a Chinese shwan-pan from the museum of the East India Company.)

The Chinese shwan-pan consists of a small oblong board, surrounded by a high ledge, and parted downwards near the left side

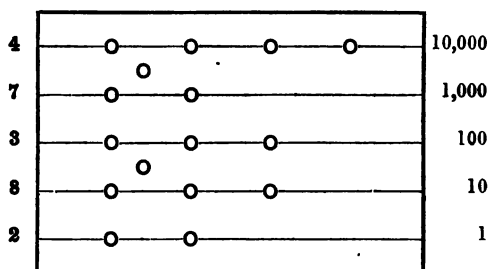


by a similar ledge. It is then divided horizontally by ten smooth and slender rods of bamboo, on which are strung two small balls of ivory or bone in the narrow compartment, and five such balls in the wider compartment; each of the latter on the several bars denoting *one*, and each of the former, for the sake of expedition, expressing *five*. The progressive bars, descending after the Chinese manner of writing, have their values increased tenfold at each step.

The arrangement here figured will hence signify, reckoning downwards, 5,804,712,063. The shwan-pan advances the length of ten billions, and therefore a thousand times farther than the Roman abacus. But the capital improvement which the Chinese had made, was, by commencing the units with any particular bar, to represent the decimal subdivision on the same instrument. Yet this most useful extension of the denary scale, however obvious it may now appear, was unknown in Europe before the time of Stevinus.

The abacus chiefly used in European countries is nearly upon the same principles, though the use of it is here more limited, because of the arbitrary and unequal divisions of money, weights, and measures, which in China are all divided in a tenfold proportion, like our scale of common numbers. This is made by drawing any number of parallel lines, like paper used for music, at such a distance as may be at least equal to twice the diameter of a calculus, or counter. Then the value of these lines, and of the spaces between them, increases from the lowest to the highest, in a tenfold proportion. Thus, counters placed upon the first line signify so many *units* or 1's, on the second line 10's, on the third line 100's, on the fourth line 1000's, and so on; in like manner a counter placed in the first space, between the first and second lines, denotes 5, in the second space 50, in the third space 500, in the fourth space 5000, and so on, so that there are never more than four

counters placed on any line, nor more than one placed in any space, this being of the same value as five counters on the next line below. So the counters on the abacus, in the figure here below, express the number or sum 47,382.



The Russian abacus of the present day is called a *shiot*, and every shopkeeper, every travelling merchant, is provided with one. That modern travellers, who know nothing of the language, find the abacus useful, is fully proved by the following observations, which I find in Oliphant's *Shores of the Black Sea*, lately published (1853):—"Finally, we became very expert in driving a bargain by means of wooden beads strung upon parallel wires, and fastened into a square frame. With these originally-constructed tables, a Russian shopkeeper performs the most elaborate calculations with the greatest rapidity; and though rather perplexing at first, we found them very useful and convenient indicators of sums which it would have been hopeless to attempt expressing in any other way."

Besides the above instruments of computation, there have been several others, invented by different persons—as, Napier's rods or bones, described in his *Rabdologia*; also the abacus rabdologicus, a variation of Napier's, which is described in the first volume of *Machines et Inventions approuvées par l'Académie Royale des Sciences*. An ingenious and general one was also invented by Mr. Gamaliel Somethwest, and is described in the *Philosophical Transactions*, vol. xlv., where the inventor remarks that computations by it are much quicker and easier than by the pen, are less burdensome to the memory, and can be performed by blind persons, or in the dark as well as in the light. A very comprehensive instrument of this kind was also contrived by the late learned Dr. Nicholas Sanderson, by which he performed very intricate calculations; an account of it is prefixed to the first volume of his algebra, and it is there by the editor called *palpable arithmetic*. Dr. Sanderson had the misfortune to be blind from the age of one year, and contrived

the instrument for his own particular case. By reference to Leslie and Hutton, additional information as to these "aids to calculation" will be received.

I shall only here refer further to the hints thrown out by Professor De Morgan in his evidence as to the extended use of logarithms and of the sliding scales now used in some branches of business. The following is taken from his evidence :—

"The arbitration of exchanges is a very complicated consideration with the present system. In 1802 a book was published by a gentleman of the name of Teschemacher, for the arbitration of exchanges by the use of logarithms. It did not mention the word 'logarithms,' because that would have frightened the mercantile men. It did not come into use, because it was not properly introduced, and was sold at a very high price; and I only mention it as showing my own knowledge that a system of logarithms would be a very material aid in the question of the arbitration of exchanges. I will mention another instance, and that is the sliding rule which the carpenters and engineers use, which is the logarithmic rule, very easy to understand, and easy to apply to any decimal system. It is not impossible to apply a sliding rule of calculation to our system as it is, but though it is not impossible, it is practically impossible; it is impracticable, as the difficulty of using it with pounds, shillings, and pence, would be too great. Brokers, for instance, and persons who have to make calculations and adaptations very quickly to find out the proper price of one stock according to the price of another stock, might use the sliding rule to very great advantage."

If we adopt a decimal system of numeration and coinage, I have no doubt business men will soon become adepts in the use of all these important aids to calculation, and logarithmic tables will come to be used with as much facility as an ordinary interest table.

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*On Multiplication by aid of a Table of Single Entry.*

By J. J. SYLVESTER, M.A., F.R.S.

A REMARK has been conveyed to me by Mr. Cayley, as occurring somewhere in Gergonne's *Annales*, which is, I think, of sufficient interest for the purposes of practical computation, and especially as applicable to questions of the class which occur in actuarial practice, to justify its introduction to the notice of the readers of this *Journal*. This remark is to the effect that a table of single entry, sufficiently extensive, will serve to give the product of any two numbers by the aid of the processes of addition and subtraction alone, just as is the case in logarithmic computation, but with the advantage over that method of perfect precision in the

result, and of the number of findings required for each computation being only two in number, the third and by far the most troublesome of the three findings—viz., that of finding back the number corresponding to the result of the linear (meaning thereby additive or subtractive) process—which occurs in the logarithmic, not arising in the method about to be explained, which we shall presently see admits of being extended, without much additional complexity, to the direct multiplication of three or any greater number of numerical factors.

For two factors a table of squares must be supposed to be given. Such exists in Barlow's tables (which, for the sake of the column of reciprocals which they contain, are in the hands of every actuary, so called, capable of performing his own computations) up to the base 10,000, and in Hutton's tables as far as the base 25,400.

Suppose, now, that  $a$  and  $b$  are any two numbers both even or both odd, we may proceed as follows:—

Take the two numbers which are the respective half sum and half difference of  $a$  and  $b$ ; find the squares corresponding to these respectively from the given table; the difference of these squares will be the product of the given numbers  $a$  and  $b$ , as is apparent from the identity,

$$ab = \left( \frac{a+b}{2} \right)^2 - \left( \frac{a-b}{2} \right)^2.*$$

If one of the given numbers is even and the other odd, we may diminish either one of the two given numbers by a unit (it will practically be best to diminish the greater), apply the rule as above stated to the given couple of numbers thus modified, and increase the result by the remaining one of the given numbers (*i. e.*, the lesser of the two, if the greater be the one diminished). We may thus, by aid of Hutton's Table of Squares, multiply any two numbers together whose sum does not exceed 50,801; and, by the more easily accessible tables of Barlow, any two numbers whose sum does not exceed 20,001.

Again, these same tables of Barlow (which contain the cubes of numbers in addition to the squares) give the means of finding the continued product of three numbers by an analogous linear method.

\* To render the process given by this formula strictly linear, the table employed should be that of the fourth parts of the squares of numbers (rejecting the fraction for the odd numbers) in place of a table of the squares themselves. A like remark will apply, subject to certain modifications as regards the fractional part, to the general case. For the product of two numbers the scheme of the operations will thus come to consist of an addition, two subtractions, and two direct findings—in lieu of the addition, two direct and one reverse findings, required in the logarithmic process.

For this purpose we must use the formula of identity,

$$abc = \frac{1}{24} \left\{ (a+b+c)^3 - (a+b-c)^3 - (c+a-b)^3 - (b+c-a)^3 \right\}.$$

If  $a, b, c$  are all or only one of them even, this may be put under the form

$$abc = \frac{1}{3} \left\{ \left( \frac{a+b+c}{2} \right)^3 - \left( \frac{a+b-c}{2} \right)^3 - \left( \frac{c+a-b}{2} \right)^3 - \left( \frac{b+c-a}{2} \right)^3 \right\}^{\frac{1}{2}};$$

and the method may be applied, by aid of Barlow's tables, to any three such numbers (subject to this condition) whose united sum does not exceed 20,000. Practical modifications to meet the contrary supposition will readily suggest themselves to the skilled computer.

It may be worth while to subjoin the general formula for expressing the product of any number ( $r$ ) of quantities in terms of the  $r$ th powers of their linear combinations.\*

Let  $a_1, a_2, a_3 \dots a_r$ , be the  $r$  numbers in question, and in general let  $\theta_1, \theta_2, \theta_3 \dots \theta_r$ , be disjunctively equal, in some unascertained order of relation, to 1, 2, 3  $\dots r$ ; then

$$\begin{aligned} a_1, a_2, a_3 \dots a_r = & \frac{1}{4.6 \dots (2r)} \left\{ (a_{\theta_1} + a_{\theta_2} + a_{\theta_3} + \dots a_{\theta_r})^r - \right. \\ & \sum (-a_{\theta_1} + a_{\theta_2} + a_{\theta_3} + \dots + a_{\theta_r})^r + \sum (-a_{\theta_1} - a_{\theta_2} + a_{\theta_3} + \dots + a_{\theta_r})^r + \&c. \\ & \left. + (-)^i \left( \frac{1}{2} \right)^q \sum (-a_{\theta_1} - a_{\theta_2} \dots - a_{\theta_i} + a_{\theta_{i+1}} \dots + a_{\theta_r})^r \right\}; \end{aligned}$$

where  $i = \frac{r}{2}$  and  $q = 1$  if  $r$  is even, and  $i = \frac{r-1}{2}$  and  $q = 0$  if  $r$  is odd.

I shall be glad to think that this brief and simple exposition may prove useful in any degree to the practical computer; any saving of labour of this kind, however slight in itself, when multiplied by the number of arithmeticians continuing their labours through countless ages, gives rise to an accumulation of savings which an ordinary feeling of benevolence must show the importance of not disregarding. It is proverbial, that more fortunes are saved than gained; and it is equally true, that the greatest benefits to society result from minute but incessant contributions from a thousand different sources to that general fund of experience, skill, and knowledge, which constitutes by far the most valuable portion of its capital stock.

\* For a proof of this theorem, see *London and Edinburgh Philosophical Magazine*, April, 1854. The total number of terms in the right-hand side of the equation is easily seen to be  $2^{r-1}$ .



*Operation of the Income Tax Enactment, as regards any Abatement on payment of Single Premiums.*

THE following correspondence, on a question which we believe has not occurred to the managers of the London Offices, will no doubt be read with some interest by them :—

“Edinburgh Life Assurance Office,  
“Edinburgh, 16th Sept., 1853.

“SIR,—I have been requested to write you on behalf of the associated Scottish Life Assurance Offices, in reference to the effect of the Income Tax Act, in authorizing an abatement of duty in respect of existing insurances which have been effected by a single payment. We feel that the parties who are insured with us upon this principle will expect to get a corresponding deduction, according to the annual premium which at the time of insuring was equivalent to the single payment; and they will look to the Offices to give them the necessary assistance and information to enable them to obtain the deduction.

“I have no doubt that this subject has been under your consideration; and I think it would be contrary to the spirit of the Act, if those parties who have selected this mode of insurance were refused the same boon with those who have adopted the mode of annual payments to accomplish the same object.

“The number of policies paid up at once, in this way, must be comparatively trifling; but of all the different plans of insurance, it is the one most to be encouraged as a permanent and certain provision, and therefore it will be felt to be a hardship if no abatement is allowed on such insurances.

“If you have not finally determined the point, I shall beg the favour of being allowed to state the arguments on which I would press the abatement being allowed.

“I beg, on the part of the Offices, to return you our best thanks for the permission to use adhesive stamps, which will be a great boon to us; and I fully believe that the views which have been adopted by the legislature for the encouragement of life assurance and the protection of those who avail themselves of its benefits, will have a great effect in promoting the good and preventing the evil consequences of such insurances.

“I have the honour to be, &c.,

(Signed) “GILBERT L. FINLAY.

“James Wilson, Esq., Treasury.”

“Treasury, 23rd September, 1853.

“SIR,—I am directed by Mr. Wilson to acknowledge the receipt of your letter of 16th instant, submitting that persons who have effected an insurance by means of a single payment will expect a deduction corresponding to that accorded under the operation of the Income Tax Act to those who have adopted the mode of annual payments, and I am to state that this subject will receive Mr. Wilson’s consideration; and if you have any further observations to make, he would be glad to receive them at once.

“I am, &c.,

(Signed)

“WILLIAM LAW.

“G. L. Finlay, Esq.”

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“Edinburgh Life Assurance Office,

“Edinburgh, 24th Sept., 1853.

“SIR,—I avail myself of your permission, as contained in Mr. Law’s letter of yesterday, to state shortly the reasons why parties who have effected insurances upon their lives by a single payment should have the same benefit of the deduction from their income, in abatement of their tax, as those who have adopted the plan of annual payments.

“At the time of effecting an insurance, a party has various different modes of doing it, equally within his power; and one of these is, to pay down a single premium, equivalent to the annual premiums which require to be paid annually during the whole of life. When the insurance is by an annual payment, the party has it in his power to discontinue it every year; and by so doing, or even by neglecting to make the payment within a certain prescribed time, the benefit of the policy as a family provision becomes forfeited and lost: whereas a policy effected by a single payment is liable to no such risks, and is therefore, of all modes of insurance, the one most deserving of encouragement. Now as the object of the legislature is to encourage parties whose income is dependant on their lives to make such provision for their families as will convert a part of that income into capital, it would be inconsistent with the intention of the late Act if those who have adopted the single-payment insurance should be denied the advantages which have been conferred in connection with the annual payments.

“There appears to be no difficulty in fixing a safe, equitable, and simple rule for ascertaining what the abatement should be. The policy itself will prove the sum assured, and the age of the

party at the time it was issued; and therefore there can be no doubt what the corresponding annual premium would have been: but in addition to this, it would be reasonable to require a certificate from the Office, stating what the annual premium would have been for that special insurance, and that the policy is still in force. This is necessary because a party may surrender his policy, or a part of it, equally in the case of a single as an annual payment; and therefore an official certificate of what is the state of that policy is necessary, to authorize the abatement for each year.

"It appears not only desirable to give every encouragement to this mode of insurance, but it may be safely assumed that such encouragement will never have any great effect in increasing the number of such policies. The number existing is comparatively very limited; and, from the necessity of making a large immediate advance, the single-payment insurances will never become a common mode of insuring.

"If the party who devotes a portion of his annual income to the purpose of providing for his family at his death is to obtain a boon from the legislature to encourage him in his laudable provident expenditure, surely the party who has already sunk a part of his capital, irrecoverably, for the same purpose, ought to be put on exactly the same footing.

"I have stated shortly what occurs to me; but I have no doubt that additional reasons might be given, if necessary.

"I am, &c.,

(Signed)

"GILBERT L. FINLAY.

"James Wilson, Esq."

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"The Craig, Windermere,

"24th October, 1853.

"SIR,—I have duly considered the purport of your letters of the 16th and 24th of September, in relation to an allowance under the income tax with regard to life policies effected by a single payment. I am sorry I cannot concur in the views you express. I have stated my conclusion and grounds fully in a minute which I send to town to-day, and which will be forthwith communicated to you officially; so that I need not repeat them here.

"I am, &c.,

(Signed)

"JAMES WILSON.

"G. L. Finlay, Esq."

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“Treasury Chambers, 31st October, 1853.

“SIR,—The Lords Commissioners of Her Majesty’s Treasury have had before them your letters of the 16th and 24th ultimo, on behalf of the associated Scottish Life Assurance Offices, and claiming, with regard to insurances effected on lives by a single payment made at the time of granting the policy, that a similar allowance should be made in favour of such persons, by way of a corresponding deduction from their incomes chargeable to the property tax, as is provided for by the Act of the last session in favour of those who pay annual premiums for life insurance.

“I am commanded to acquaint you that my Lords cannot concur in the reasoning by which it is sought to establish an analogy between the two cases, so far as the object of the Act is concerned. That object was not, as it seems to be assumed, to encourage or promote life insurances (which however my Lords would be glad on perfectly independent and separate grounds to do), but in order to afford to some extent, and in that way, relief to those who, possessing precarious incomes, make a provision for the future by applying a portion of such income to the insurance of their lives. My Lords regard such allowance as an approximation to the principle that has been contended for in relation to professional incomes—that the fair way to compute them for the income tax would be to deduct as much as would, being paid as an annual premium, secure at death a capital sum, which would yield an interest in perpetuity equal to the income actually subject to charge; thus rendering a temporary income as permanent as one derived from the funds. It is therefore obvious that the deduction has reference to a payment out of income only.

“My Lords regard a life insurance effected by a single payment in an entirely different light, being simply an investment of so much capital at a particular period of life, in purchase of a sum of money contingent on the death of the party. In the one case the payment is from a precarious income, which it is intended to relieve; in the other case it is an investment of capital, which there is no pretext for relieving. The law provides only for such allowance being made in the case of annual payments; and my Lords are of opinion that it ought not to be extended to policies effected on single payments.

“I remain, Sir,

“Your obedient Servant,

“C. E. TREVELYAN.

“G. Finlay, Esq., &c. &c.,  
“22, George Street, Edinburgh.”

## NOTES AND QUERIES.

PROFESSOR DE MORGAN favours us with the following problem, and, as will be observed, invites solutions of it:—

For abbreviation, let  $(1+r)^n$  be represented by  $1+1_n r+2_n r^2+3_n r^3+\dots$

The fractions whose numerators are  $(1+r)^n-1$ ,  $(1+r)^n-1-1_n r$ ,  $(1+r)^n-1-1_n r-2_n r^2$ ,  $(1+r)^n-1-1_n r-2_n r^2-3_n r^3$ , &c., and whose denominators are  $r$ ,  $r^2$ ,  $r^3$ ,  $r^4$ , &c., represent the accumulations of the annuities 1, 1, 1, &c. for  $n$  years; 1, 2, 3, &c. for  $n-1$  years; 1, 3, 6, &c. for  $n-2$  years; 1, 4, 10, &c. for  $n-3$  years; &c.

Required a proof; *the calculus of differences and all summation of series involving powers being excluded.*

## CORRESPONDENCE.

## THE INTEREST QUESTION.

*To the Editor of the Assurance Magazine.*

SIR,—In your last Number\* of the *Assurance Magazine*, “A Young Associate,” who seems to be inspired with the doctrines of a *well known writer*, has attempted to defend the theory of the latter—first, by pointing out to me the solution to the problem specified at the conclusion of my letter in No. XII. of your *Magazine*; and, secondly, by directing my attention to the work of Mr. Rouse, who, like myself, in the opinion of the writer, erred in assuming the geometrical mean of  $(1+d)^{\frac{1}{2}}$  between 1 and  $(1+d)$ , instead of the arithmetical mean of  $\left(1+\frac{d}{2}\right)$ , as in common use.

I venture to suppose that, like myself, all truly mathematical readers will consider that in cases of compound interest, which forms a strictly *geometrical series*, the upholding an arithmetical mean against a geometrical mean is in itself *mean* indeed, and *means* nothing; as will be demonstrated presently. Moreover, to cite *common use* in a question of a purely mathematical character, is really absurd, and no *common sense*!

Mr. Farren, in No. XI. of your periodical, inserted a paper wholly directed against Simpson and Dodson, for having imagined that De Moivre assigned  $1-iA$  as the present value of £1 payable at the end of the year of death, and for having accordingly adopted that value. Mr. Farren states, that “there are reasons (?) for imagining that, in *one case at least*,† this celebrated analyst fell into no such error, but correctly (?) assigned  $1-iA$  as the present value of £1 due at the *beginning* of the year of death,

\* This communication was intended for the January Number, but was received too late for insertion in it.—ED. A. M.

† I suppose that by the indefinite expression “*one case at least*,” Mr. Farren meant *this case*, the one at issue; but preferred saying *one*, as an indication that on all other subjects De Moivre *did* fall into error—an inference which, however, must be made with caution.

and bearing interest until actual payment ensued." Mr. Farren then proceeds to prove the truth of his discovery, by quoting a certain paragraph from De Moivre, and adding thereto a commentary of his own; whereby he fancies to have established an indisputable fact, that half a year's interest above any number of years is to be obtained by multiplying the amount accumulated at the beginning of that half year by  $\frac{1}{2}$ .

I, on my part, in No. XII. of your *Magazine*, have proved from the very work of De Moivre that Mr. Farren's supposition was unfounded; and that, on the contrary, De Moivre directed to value a portion of a year by adding the logarithm of the amount as accumulated at the beginning of the broken year to a similar portion of the logarithm of one year's interest: and, in order to substantiate my refutation, I concluded my letter with the problem on compound interest, whereby I had every reason to anticipate that your readers might discover that not only did Mr. Farren fail in his attempt to give a wrong interpretation to De Moivre, but that actually there is *no* other mode for finding the true mathematical value. However, it appears that your correspondent, the admirer of a *well known writer*, failed to comprehend my intention with the problem in question, and accordingly informs me that all English elementary treatises on algebra demonstrate that if  $s(1+d)^x$  is to equal  $a$ , that  $x$ , as a period of duration, will equal the logarithm of  $a$  divided by the logarithm of  $s(1+d)$ . Well, the "Young Associate," who seems to be prejudiced against foreigners (no doubt a *common use* with him), may learn from his very solution, as derived from English elementary treatises, that both he and the well known writer *are* in error, and ought not to jump to conclusions too rapidly, without mature consideration. He must remember that from time immemorial it was a *common use* to teach that the sun revolved round our earth; and that not until the sixteenth century, Copernicus, a *foreigner*—I am proud to say, a Pole, too—turned the tables, in establishing the fact that the earth revolves round the sun, as also corroborated in the English elementary treatises.

Now to the subject:—

PROBLEM I.—A sum of £1,000 is put out at compound interest at 3 per cent. per annum, for a period of  $75\frac{1}{2}$  years. It is required to find the amount.

*Solution.*—According to Mr. Farren, and *common use*, the amount in 75 years is £9,178·92566, to which must be added half a year's interest, £137·68888=£9,178·92566  $\times$  0·015; the sum of £9,316·60954 is the amount required.

PROBLEM II.—A sum of £1,000 is put out at compound interest at 3 per cent. per annum, until the amount reaches the sum of £9,316·60954. To find the period of duration.

*Solution.*—According to all elementary treatises, English or foreign, as also pointed out by "A Young Associate," the logarithm of £9,316·60954 is to be divided by the logarithm of £1,000 (1·03). Thus  $\frac{\cdot9692578945}{\cdot0128372247}=75\cdot50369 \dots$  the period required.

Everyone will perceive that in the two foregoing problems the very identical values are employed; and yet in the former the period  $x$  is fixed

to be neither more nor less than 75·5 years, whilst, according to *common use*, the same term in the second problem amounts to 75·50369 years. Thus, according to Mr. Farren, "A Young Associate," and others,  $75·5 = 75·50369$ !

I need scarcely observe, that the difference between the two values will always increase as may increase the period  $x$ . It is manifest that, if the portion of the last year be fixed as a finite, the quotient obtained by dividing the logarithm of the amount by the logarithm of  $i$  must invariably consist of a finite quantity, which can never be the case if the interest of the broken period is allowed to be obtained by multiplying the amount at the beginning of the year by  $\frac{i}{2}$ .

I enclose herewith a letter for publication, addressed to me by a celebrated mathematician, late actuary of the "Alliance," on the subject in dispute, whose opinion tends to confirm my own views.

I remain, Sir,

• Your most obedient Servant,

*Standard Life Office,  
Edinburgh, Dec. 19, 1853.*

HERSCHEL FILIPOWSKI.

"To H. FILIPOWSKI, Esq.

"MY DEAR SIR,—Having in my reply to your letter of the 7th of last month expressed my reluctance to enter on the discussion of the question between yourself and other scientific gentlemen, and you having in reply to me still expressed a wish that I should give *you* my opinion of your ideas—I will, with a view of complying in part with your wish (but still with a desire to avoid being compelled to enter into a scientific discussion with gentlemen who may be disposed to maintain their own views, and to support those views by arguments, which may appear to themselves to be uncontrovertable), take up the subject, of small pecuniary importance, but of interesting scientific accuracy; and hope to avoid any personalities, by considering the question of compound interest as a question of science, agitated from the time commencing with the excellent D'Alembert, and ending with Milne, whose death is but a recent loss to the scientific world, and whose name alone is sufficient to give a bias to opinions, if they cannot be refuted by argument.

"I consider the colloquial term of 'compound interest' to be vaguely interpreted. I consider the commercial expressions of a capital placed out, for instance at 4 per cent. per annum, payable in half-yearly interest, when it refers to a capital to be placed at compound interest, by no means to be accurately interpreted by a capital placed at compound interest at 4 per cent. per annum; but to be properly expressed by a capital placed at the semi-annual interest of 2 per cent., or by a capital placed at the annual rate of 4·04 per cent. compound interest. And with this definition: 2 per cent. half-yearly interest would be perfectly consistent; and then, if  $n$  be a whole number, and the annual rate of interest be (as it would be, in fact) 4·04 per cent. per annum, the amount in  $n$  years, with compound interest, of £100, would be  $1·0404^n \times £100$ ; and if  $n$  were the fraction  $\frac{1}{2}$ , the expression would still apply, and become  $1·0404^{\frac{1}{2}} \times £100$ , as this would evidently be £102, agreeing with the proposed fact. So that, if

£100 be put to compound interest at the annual rate of 4·04 per cent., and it were recalled at the expiration of half a year, the amount with interest would be £102, and would be less actually than if the half year's interest were calculated on the scale of simple interest, estimating the annual interest at 4·04 per cent., which is real annual interest per annum, proposed (a fact, I think, considered by Mr. Milne as remarkably inconsistent) on the supposition at least that money is at all times and almost immediately convertible into capital—which it generally is, though there may be occasional short periods at times when money cannot be so turned; and such periods would not vitiate the universality of the definition, but alter the condition of the case to be stated, which would allow of  $\overline{1+r^n}$  expressing the amount of unity placed at compound interest for  $n$  years, at the annual rate of  $r$  per unit, whether  $n$  were whole, broken, or negative; and I think even those persons who would aim at a distinction between the cases of  $n$  integer and  $n$  fractional would allow, that if  $n$  were negative  $= -m$ ,  $m$  being an integer, that  $\overline{1+r^n} = \overline{1+r^{-m}}$  would express the value of the sum which had been put to compound interest; for  $m$  years, at the rate of  $r$  per annum, per unit, would amount to unity: or, in other words, that the present value of unity to be received in  $m$  years is truly expressed

by  $\frac{1}{\overline{1+r^m}}$ . And I observe, that the semi-annual interest of 2 per cent. on

a given sum would give 2 per cent. for the first half year; and that, that interest being converted into capital, the whole capital would give 2·04 per cent. for the second half year upon the original capital, though it would be but 2 per cent. on the capital increased by the first half year's interest; and that the total annual interest on the original capital would be 4·04 per cent. I therefore agree *entirely* with D'Alembert, and disagree entirely with Milne's view, with regard both to his objection to D'Alembert's views, and with his remark on Smart's tables. There may be cases in which the law might take different views to those of D'Alembert; but should there be such cases, they would not interfere with the question under my consideration, but would change the conditions of the question.

"I will conclude my letter with a case which might occur, to show that D'Alembert's opinion is right. There are three persons—A, B, C; A is a lender, B is an original borrower, and C an eventual borrower. B borrows of A £1000 for one year certain, at 5 per cent. interest per annum, and A would have required a higher interest, had it not been for the interference of the usury laws. At the expiration of a half year, B is desirous to pay back the money to A, together with the interest which shall be due upon it; but A objects, and states that the loan was intended to be for a year; and he does not know if, in case he should allow B to return capital with interest, he should be able to lend the money again, at the same rate, and to a person whom he considered as responsible and as trustworthy as B; but to oblige B, if he would engage to find a third person, C, for whom B would stand security, and C would take the money of A which is due to him from B at the same rate of interest, he would agree to comply with B's wishes: in consequence of which, B pays A what is due to him, and A immediately lends it to C. At the expiration of the half year from that period—that is, at the expiration of one year from the original period—A calls on C for the sum due, but unfortunately C cannot pay him; A therefore claims of B the capital and interest which B guaranteed C to pay him, and brings an



action for that claim. The question is, does he not require usurious interest of B?

"Now, calculation on Mr. Milne's hypothesis gives that B in the subsequent agreement pays A, at the expiration of the first half year, £102. 10s., and that A then lends to C £102. 10s., at £2. 10s. per cent. interest for the half year, which is required to complete the whole year: for were he only to lend him £100, A would leave £2. 10s. lying idle; and consequently, at the expiration of the year from the original term, C will have to pay A £105. 1s. 3d., being 1s. 3d. beyond the legal interest for which the action is brought against B. But on D'Alembert's hypothesis, B will have had only to pay at the expiration of the first half year  $£100 \times 1.05$ ; and C afterwards, for the continuance of the loan to him, and for which B is bound,  $100 \times 1.05^2 \times 1.5^2 = £105$ .

"Should these remarks tend to lessen the difficulty attaching to the case, I should be glad; but if I should be required to reply to objections which may be made to them, I feel that I should be obliged to decline doing so, and will hope that I should not be thought discourteous on that account.

"Yours truly,

"152, King's Road, Brighton,  
"3 Nov., 1853."

"BENJ. GOMPERTZ.

#### CALCULATION OF THE ODDS OF THROWING ANY SPECIFIED NUMBER WITH TWO, THREE, FOUR, OR MORE DICE.

*To the Editor of the Assurance Magazine.*

SIR,—Some persons have supposed that the doctrine of probability rather fosters than discourages habits of gambling. No doubt the error of such a supposition arises from the known facility with which its principles can be applied to games at cards and dice. It has, however, been employed to expose the nefarious practices of many, who have developed very alluring though dishonest and fatal schemes for realizing money; and through the authority and influence of your *Journal*, the science of probability might be turned to some account in exposing those pernicious practices that are of nightly occurrence in many establishments in London, especially at the West End. The uninitiated and unwary, who seek amusement in these dens of infamy, might at all events be put on their guard, by having in their possession the *true odds* in every case where betting is resorted to on games of chance; and at the same time the usefulness and importance of your *Magazine* would be considerably augmented. With this view I have made the following calculations; and at a future time, I may direct my attention to other forms and shapes under which this insidious and dangerous practice presents itself.

When the throwing is with two dice, that are homogeneous and dynamically accurate (which is *never* the case in gambling houses), the probability of throwing either of the numbers

3 or 11 is  $\frac{2}{36}$ ; the odds against are 17 to 1

4 or 10 is  $\frac{3}{36}$  " " 11 to 1

5 or 9 is  $\frac{4}{36}$ ; the odds against are 8 to 1

6 or 8 is  $\frac{5}{36}$  „ „ 31 to 5

7 is  $\frac{6}{36}$  „ „ 5 to 1

When the throwing is with three dice, the probability of throwing either of the numbers

4 or 17 is  $\frac{3}{216}$ ; the odds against are 71 to 1

5 or 16 is  $\frac{6}{216}$  „ „ 35 to 1

6 or 15 is  $\frac{10}{216}$  „ „ 103 to 5

7 or 14 is  $\frac{15}{216}$  „ „ 67 to 5

8 or 13 is  $\frac{21}{216}$  „ „ 65 to 7

9 or 12 is  $\frac{25}{216}$  „ „ 191 to 25

10 or 11 is  $\frac{27}{216}$  „ „ 7 to 1

When the throwing is with four dice, the probability of throwing either of the numbers

5 or 23 is  $\frac{4}{1296}$ ; the odds against are 323 to 1

6 or 22 is  $\frac{10}{1296}$  „ „ 643 to 5

7 or 21 is  $\frac{20}{1296}$  „ „ 319 to 5

8 or 20 is  $\frac{35}{1296}$  „ „ 1261 to 35

9 or 19 is  $\frac{56}{1296}$  „ „ 155 to 7

10 or 18 is  $\frac{80}{1296}$  „ „ 76 to 5

11 or 17 is  $\frac{104}{1296}$  „ „ 149 to 13

12 or 16 is  $\frac{125}{1296}$  „ „ 1171 to 125

13 or 15 is  $\frac{140}{1296}$  „ „ 289 to 35

14 is  $\frac{146}{1296}$  „ „ 575 to 73

In the preceding calculations, I have used the following well known process:—

If  $p$  denote the number of dice,  $n$  any particular number to be thrown, then  $6^p$  = the whole number of combinations; and the different ways in which  $n$  can be thrown is the number of combinations in which  $a + b + c +$ , &c.  $p$  terms can be made equal to  $n$ ; the several numbers from 1 to 6 being successively substituted for  $a, b, c$ , &c. This will be the same as if we raise  $(x + x^2 + x^3 + x^4 + x^5 + x^6)$  to the  $p$ th power, and determine the coefficient of  $x^n$ , which may readily be done as follows:—

$$(x + x^2 + \dots + x^6)^p = x^p \left( \frac{1 - x^6}{1 - x} \right)^p = x^p (1 - x^6)^p (1 - x)^{-p}$$

giving to  $p$  any of the values 2, 3, 4, &c., and expanding and performing the multiplication. Any coefficient in the resulting product, divided by  $6^p$ , will denote the probability of throwing the number which is the index of  $x$ , the term to which the coefficient belongs.

Your obedient Servant,

GEO. SCOTT, A.I.A.

Fortescue House, Twickenham,

Dec. 16th, 1853.

## DETERMINATION OF SURPLUS.

*To the Editor of the Assurance Magazine.*

SIR,—To ascertain the sum which a Society may safely appropriate as a bonus being one of the most momentous problems that can fall within the scope of an actuary's duties, I may perhaps be permitted to offer a few observations on the subject.

I will suppose, then, that a mutual Society has been in existence five years, and that the amount of pure divisible surplus is sought, with a view to the declaration of a bonus. After payment of the preliminary expenses, or those attendant upon the formation of the Society, the cost of management, and the claims on account of deaths, the sum  $s$  remains to credit of the Company. The present value of the future *gross* and *net* premiums on the existing policies =  $V$  and  $v$  respectively, that of the policies themselves being  $v'$ . The working expenses hitherto average  $e$  per annum; and  $n$  policies on an equality have been issued yearly. Now  $V - v' + s$  cannot be called actual surplus, since no allowance is made for future expenses, which must necessarily be incurred before the profits on the future premiums (of which  $V - v$  is the present value) can be realized. To estimate this important deduction, we can but proceed upon the experience of the past; if therefore  $A$  be the *net* premiums receivable annually on the policies issued,

$\frac{v}{A}$  will denote the average number of years these policies have to run, and the working expenses during such period =  $\frac{ve}{A}$ . Now we may reasonably

assume, if nothing be known to the contrary, that in this time  $\frac{nv}{A}$  new

policies will be granted, so that the fair proportion of the sum  $\frac{ve}{A}$  which

should be borne by the  $5n$  individuals already assured is

$$5n \times \frac{\frac{ve}{A}}{n\left(5 + \frac{v}{A}\right)} = \frac{5ve}{5A + v};$$

thus reducing the surplus to  $(V + s) - \left(v' + \frac{5ve}{5A + v}\right)$ . This sum, however (which for brevity call  $\beta$ ), being the present value of the entire profits which can ever be derived from the  $5n$  policies, would, if it were all distributed forthwith, cut off the possibility of any further bonus being allotted to these members; but it is wished at present only to give such portion of this surplus as will leave a sufficiency for an *equal bonus at least*, to be divided every  $m$  years in future. The number of prospective bonuses is  $\frac{v}{mA}$ ; hence it follows, that the sum which may now be looked upon as divisible surplus is  $\beta \div \left(1 + \frac{v}{mA}\right)$ . In deducing the expression  $\frac{5ve}{5A + v}$ ,

I have supposed the  $5n$  persons to be all alive at the present time; if, however, the decrements should be sufficiently numerous to render such a step necessary, a correction might be applied.

Some of the preceding operations, it is true, are in a mathematical sense only approximative; but the discrepancies arising therefrom being of small moment, and all "on the safe side," a greater nicety of calculation would in actual practice be but labour thrown away. Any modifications which might be deemed prudent, such as assuming that the future expenses will increase progressively in a certain ratio, could easily be made, the foregoing being intended as a mere indication of the general method to be pursued.

I am, Sir,

Your obedient Servant,

SAMUEL YOUNGER.

*Engineers' Assurance Office, 345, Strand,  
18th January, 1854.*

NOTE.—Our correspondent's object might perhaps be more easily obtained as follows:—Let the amount of premiums and interest received since the last division be denoted by  $S$ , the total expenses in the same interval by  $E$ , and the "loading" of the premiums per pound be  $\phi$ . Then the surplus fairly divisible in the case supposed will be nearly  $\phi S - E$  (see vol. ii., page 334, of this *Journal*). Of course, the correctness of such a proceeding will depend on the accuracy with which the premiums for the risk have been assumed.—ED. A. M.

## ASSURANCES ON ONE LIFE AGAINST ANOTHER, DURING THEIR JOINT DURATION, AND FOR $n$ YEARS LONGER.

*To the Editor of the Assurance Magazine.*

SIR,—In the second volume of the *Magazine*, page 95, Mr. Peter Hardy gives a formula for determining "the present value of a reversion

of £1 payable on the death of A, provided he dies before another life, B, or within  $n$  years after him." The expression is

$$\frac{{}_A^1\ddot{I}\ddot{i}}{I} + \left( \frac{{}_A^1B\ddot{I}\ddot{i}}{I} \right) \frac{a_n}{ar^n};$$

and for the convenience of those who may not be familiar with Mr. Hardy's notation, he deduces the following rule:—"To the value of a temporary assurance on the life of A, add the value of a reversion contingent on B surviving a life  $n$  years older than A, multiplied into the present value of £1 payable if A lives  $n$  years."

The formula for an insurance of this description was first given, I believe, by Mr. David Jones, in his *Treatise on Life Annuities*, Art. 230; and certainly, anything more formidable in appearance than the expression he arrives at is not to be met with in the rest of that work. The object of my troubling you on this subject is to draw the attention of those who use the Carlisle 3 per cent. Tables to the facility with which such questions may be worked out, according to Mr. Hardy's formula, by the survivorship tables of Messrs. Gray, Smith, and Orchard, and the more recent actuarial tables of Mr. William Thomas Thomson.

Take, for example, the ages of 35 and 60; and suppose it were required to find the single and annual premium for an assurance of £1 upon 35 failing before 60 or within 3 years thereafter—

Thomson, Table 2, Single Deaths, Age 35.—

Whole life assurance . . . . = 43397

Deferred assurance, 3 years = 40444

$\frac{{}_A^1\ddot{I}\ddot{i}}{I}$  = Temporary assurance for 3 years = 02953

$\frac{a_3}{ar^3}$  = 88647 Thomson, Table 1, Single Lives, age 35.

$\frac{{}_A^1B\ddot{I}\ddot{i}}{I}$  = 14503 Gray, Smith, and Orchard, Table 5,  
38 against 60.

$\left( \frac{{}_A^1B\ddot{I}\ddot{i}}{I} \right) \times \frac{a_3}{ar^3}$  = 14503 × 88647 = 128564.

$\frac{{}_A^1\ddot{I}\ddot{i}}{I} + \left( \frac{{}_A^1B\ddot{I}\ddot{i}}{I} \right) \frac{a_3}{ar^3}$  = 02953 + 128564 = 15809 = Single premium.

Annual premium payable during the joint lives =  $\frac{15809}{10.41} = 01518$

I now proceed to work out, for the sake of comparison, the same question according to Jones, and by his tables.

The formula is, when  $m_1 - t$  is greater than  $m - 1$ ,

$$\frac{M_m - M_{m+t}}{D_m} + \frac{r^{t+1} (N_{m+t-1, m_1-1} - N_{m+t, m_1-1}) + r^t (N_{m+t-1, m_1} - N_{m+t, m_1})}{2 D_{m, m_1}}.$$

$$\begin{array}{llll}
 \text{Here } m & = 35 & r^{t+1} & = r^4 = .8885 \\
 m_1 & = 60 & N_{m+t-1, m-1} & = N_{37, 59} = 33088097.7 \\
 t & = 3 & N_{m+t, m-1} & = N_{38, 59} = 32592121.7 \\
 M_m & = M_{35} = 826.9604 & r^t & = r^3 = .9151 \\
 M_{m+t} & = M_{38} = 770.6867 & N_{m+t-1, m} & = N_{37, 60} = 30326495.8 \\
 D_m & = D_{35} = 1905.566 & N_{m+t, m} & = N_{38, 60} = 29876452.1 \\
 2D_{m, m} & = 2D_{35, 60} = 2 \times 3315526.4 & & = 6631052.8
 \end{array}$$

And the above formula becomes, by substitution,

$$\frac{56.2737}{1905.566} + \frac{.8885 \times 495976 + .9151 \times 450043.7}{6631052.8} \\
 = .02953 + .12856 = .15809, \text{ the single premium, as before.}$$

It will be seen that the expression given by Mr. Hardy, when the tables of Mr. Thomson, and Messrs. Gray, Smith, and Orchard, are used, affords the means of ascertaining the premium for risks of this description much more readily than the method of solution given by Jones. Insurances of the kind have become very frequent of late; and it is impossible for the practical actuary to estimate too highly the services of those who are at the trouble of pointing out the most concise methods of solution, and who supply us with such valuable auxiliary tables as those which Mr. David Jones, Mr. William Thomas Thomson, and Messrs. Gray, Smith, and Orchard, have had the courage to compute.

I am, Sir,

Yours faithfully,

ROBERT TUCKER.

Lombard Street,  
25th February, 1854.

*Postscript.*—By the time this letter appears in the *Magazine*, many of your readers will have heard with regret of the death of Mr. William Orchard, one of the writers above alluded to. The loss at so early an age of one who had already done so much and had given promise of still greater things, must be deplored by all who are interested in actuarial pursuits. Mr. Orchard was one of the earliest applicants for admission to the Institute; he was likewise among the first of the Associates who came forward for examination; and it will be in the recollection of the members, that he passed with such great credit as to induce the Examiners to recommend him for election as a Fellow, in conjunction with Mr. Bailey and Mr. Porter. Although Mr. Orchard was not at that time so well known by his writings, he was much to be commended for undergoing that voluntary examination, which perhaps was scarcely necessary, to place beyond a doubt his fitness to become an actuary. He was a self educated mathematician, and owes the reputation he has earned entirely to his own unaided exertions and persevering industry. It is understood he has left behind him in an unfinished state some valuable contributions to the theory of life contingencies, which by directions in his will are to be confided to an intimate friend, and it is to be hoped they will some day be made public.

## THE INTEREST QUESTION.

*To the Editor of the Assurance Magazine.*

SIR,—Will you allow me to add, as a *postscript* to my letter of December last, the following few lines on the *interest* question?

No one will dispute that the progressive series in the capital and interest is of a geometrical character; wherefore the amount of the 1st year bears the same proportion to that of the 2nd year, as does that of the latter to that of the 3rd year. In like manner, 2nd : 3rd = 3rd : 4th, and so on.

Example, at 3 per cent. compound interest:—

$$\begin{array}{lcl} \text{1st year} & \dots\dots\dots & 1\cdot03^1 : 103^2 = 103^2 : 103^3 \\ \text{2nd } ,, & \dots\dots\dots & 1\cdot03^2 : 103^3 = 103^3 : 103^4 \\ \text{3rd } ,, & \dots\dots\dots & 1\cdot03^3 : 103^4 = 103^4 : 103^5 \\ \text{4th } ,, & \dots\dots\dots & 1\cdot03^4 : 103^5 = 103^5 : 103^6 \\ \text{nth } ,, & \dots\dots\dots & 1\cdot03^n : 103^{n+1} = 103^{n+1} : 103^{n+2} \end{array}$$

Now the entire question may be reduced to this: Is the amount at half year to be considered the geometrical mean in relation to the respective amounts of the two years between which it lies? If so, how is that mean to be obtained? Is it by halving the difference of the two terms, and adding the same to the lesser, as is pointed out by Mr. Farren and “A Young Associate”; or, by taking, as the mean required, the square root of the product of the two given terms?

In the former case:—

$$1\cdot03 : \left\{ \frac{1\cdot03^2 - 1\cdot03}{2} + 1\cdot03 \right\} = \left\{ \frac{1\cdot03^2 - 1\cdot03}{2} + 1\cdot03 \right\} : 1\cdot03^2;$$

or, (a)  $103 : 1\cdot04545 = 1\cdot04545 : 1\cdot0609$ ; or, (b)  $1\cdot03^2 = 1\cdot04545^2$ ; or, (c)  $1\cdot092727 = 1\cdot0929657025$ !

While in the latter case,  $103 : \sqrt{1\cdot03^3} = \sqrt{1\cdot03^3} : 103^2$ ; by which equation we correctly obtain,  $\sqrt{103^3} \times \sqrt{1\cdot03^3} = 1\cdot03 \times 1\cdot03^2 = 1\cdot03^3$ .

To dwell any further on the subject, would be as much as an endeavour to prove that 3 times 4 are not 13, but 12; or the like.

March 1, 1854.

H. F.

We insert this second letter of Mr. Filipowski at his request, although it contains little else than a reiteration of the notions expressed in the first. The following communication, we think, will serve to show him that the entire question is not quite as he would state it.—Ed. A. M.

*To the Editor of the Assurance Magazine.*

SIR,—As it would appear, from the slip prefixed to the last Number of the *Assurance Magazine*, that you are to insert in the forthcoming Number a communication from Mr. Filipowski, with reference, it is presumed, to Mr. Sang’s method of determining the value of an assurance payable at the moment of death, perhaps you will allow another correspondent to make a few remarks on the same subject.

Notwithstanding all the learned dust which the discussion of this *veraxta questio* has raised, the whole point at issue seems really to be neither more nor less than—how to ascertain the interest of £1 from the day of death till the end of the year then current. Once this is determined, we have only to find what the sum assured with interest from the day of death will amount to at the end of the year, and then to calculate in the ordinary way the value of an assurance of that amount; the result thus obtained being the value of the sum assured payable on the day of death. It must, indeed, be evident that, after the death has occurred, the only elements affecting the calculation are, the rate of interest and the period for which it has to run.

Holding then, according to the ordinary hypothesis, that the period between the day of death and the end of the current assurance year may on an average be reckoned as half a year, we have, in order to ascertain the value of an assurance of £1 payable at death, to find the amount of £1 with a half year's interest thereon, and then to calculate by the ordinary rule the value of an assurance for that amount. Now according to ordinary practice and understanding, the interest of £1 for half a year at 3 per cent. per annum is  $\cdot 015$ ; so that the premium for, or value of, an assurance of £1 payable at death, will be the same with the premium for, or value of, an assurance of £1 $\cdot 015$ , ascertained in the ordinary way, and payable at the end of the year in which death takes place, or at the end of six months from the death.

According to Mr. Sang, on the other hand, the interest of £1 for half a year, at the rate of 3 per cent. per annum, is  $\cdot 01488916$ ; and consequently the sum to be assured is 1 $\cdot 01488916$  in place of 1 $\cdot 015$ . In other words, he proceeds on the assumption that interest is accumulated momentarily, at such a rate as to produce  $\cdot 01488916$  per £1 at the end of half a year, and £ $\cdot 03$  at the end of a year.\*

It may be questioned however, whether, even if otherwise admissible, the application of this extreme mathematical notion of the principle of compound interest is consistent with the conditions on which in practice the returns on actual investments are made and calculated. We hear of interest being receivable half yearly and quarterly at certain rates; and we know that when interest is charged for periods shorter than a year, it is universally taken at a proportion for the time of the ordinary simple interest for a year. There is no instance however of an engagement to allow interest to be *accumulated de die in diem*. But even admitting that interest ought to be dealt with on the principle of momentarily accumulations, the application of that principle must be extended to the whole period of the assurance, and ought not to be confined merely to the period subsequent to the death. In like manner, to be consistent, a similar principle ought to be adopted with reference to the probabilities of life; for there is no reason for the adoption of momentarily accumulations of interest which does

\* Half yearly or quarterly accumulations at the rates respectively of  $\cdot 0148891$  and  $\cdot 00741707$ , and daily accumulations at the rate of  $\cdot 00008099$ , would produce the same result. But it is evident that the principle of *momentarily* accumulations must be adopted as the general rule, otherwise the number of accumulations per annum would have to be varied, whenever the period for payment of the sum assured was altered either from the date of death or the end of the year of death. See Baily's *Doctrine of Interest and Annuities*, where the difference between the true and the nominal rate of interest, and the effect of compound interest when fractional portions of a year have to be taken into account, are fully discussed; and a Table is given, showing the amount of £1 in any number of days at various rates of compound interest.



not equally apply to the introduction *momently* of the risk of death. Accordingly, different formulæ are given in the books, for determining the value of an assurance for every *half year*, quarter year, &c. of existence, interest being accumulated at same periods; and in chap. x. § 360 of Mr. Bailey's *Treatise on Life Annuities*, we are presented with the following formula for finding the value of a "sum to be received *immediately* on the extinction of the given life":—

$$\frac{s \cdot \rho}{\text{Nap. L. } (1 + \rho)} \times \frac{1 - \rho A}{1 + \rho},$$

where  $\rho$  represents the true annual rate of interest, which, even on Mr. Sang's principle, is here 3 per cent. It is somewhat remarkable that Mr. Bailey gives, as a near approximation to the above, but as "more convenient for practice," the following formula:—

$$s \left( 1 + \frac{\rho}{2} \right) \times \frac{1 - \rho A}{1 + \rho},$$

which on examination will be found to be identical with the rule usually adopted, viz., the addition of half a year's simple interest to the sum assured.

I have thus shown, as I think satisfactorily, that the common method of deducing the value of an assurance payable at death, from that of an assurance payable at the end of the year in which death takes place (by adding six months' simple interest to the amount assured), is preferable to that adopted by Mr. Sang,—whether we assume the ordinary commercial principle of calculating at simple interest for fractional portions of a year, or adopt the strict mathematical idea that the effects of interest and mortality are to be dealt with as arising *momently*.

I shall now, before closing, notice shortly the challenge thrown out by Mr. Filipowski, in a communication inserted in the 12th Number of this *Journal*. He there asks, how Mr. Farren would solve the problem—"In what time will the sum  $s$  amount to  $a$ , at  $d$  compound interest?" Now this might be answered, Scotch fashion, by putting another question, viz., Whether by  $d$  is meant the rate of interest *per annum*, or for what other period? and, if it is the rate per annum, *how often* interest is supposed to be accumulated in the course of the year? In point of fact, as a mathematical problem, the question should have been stated thus:—"How frequently will interest require to be accumulated in order to produce  $d$  per cent. per annum, and at the same time to make  $s$  amount to  $a$ ?" As the question is put by Mr. Filipowski, it is obvious that, unless he holds that the principle of momentarily accumulation is essential to the notion of compound interest, it is quite possible that no definite answer can be given to it.

The puzzle here, as in many other disputes, arises from the parties not having defined precisely the meaning of the terms employed by them. Let it be distinctly understood what is meant by "compound interest," and there is no fear but the mathematical conclusion will be accurately arrived at by all.

I am your most obedient Servant,

I.

P.S. It would certainly appear, as you lately remarked, that the Northern actuaries have a special delight in the calculation of tables; otherwise I

cannot conceive what could have induced Mr. Chisholm to frame D and N columns with reference to this question, when the whole difference arises from an addition made to the sum assured.

## MEDICAL STATISTICS OF LIFE ASSURANCE COMPANIES.

*To the Editor of the Assurance Magazine.*

SIR—I have recently (through the courtesy of the managers of the respective Companies) had an opportunity of perusing two reports,\* the one by Dr. Christison, of the Standard Assurance Company, and the other by Dr. Begbie, of the Scottish Widows' Fund, on the subject of the mortality experienced in these two Offices.

As I believe these papers are not in general circulation, having been published originally in the *Monthly Journal of Medical Science*, and subsequently printed only for the private information of the members of the two Companies, probably some remarks upon them may not be unacceptable to your readers.

The papers in question are prepared by the medical officers of the two Companies, and form a valuable contribution to life assurance statistics.

With the exception of an account given by one of the present writers, Dr. Begbie, in the year 1847, of the experience in respect of mortality of the Scottish Widows' Fund, little or nothing of the kind now under consideration seems to have been published up to the present time. The reason given for this is, that very few Companies of sufficient standing can afford data on which such investigations could be satisfactorily based, owing to the meagre nature of the documents on which, until lately, Assurance Companies have been contented to accept their risks; and probably the documentary evidence adduced in proof of death has not been, prior to the organization of the Registrar General's department in the year 1837, of a more satisfactory nature.

There can be no doubt, I think, that the formation of the Institute of Actuaries is likely to give a great impetus to scientific inquiries of this nature. Their extreme importance to Assurance Companies is manifest; and the directors of these Societies, however unaware at present they may be of the fact, are in many ways reaping the fruits of an institution of the very existence of which they may not perhaps even be cognizant. It is from such inquiries as these, however, that the real practical use of the Institute will become apparent to them; for both the papers under discussion show, *inter alia*, how very important a careful selection of lives becomes: and this is particularly the province of the directors, of course under the advice of their physician.

The Standard Life Assurance Company was founded in the year 1825, and the Scottish Widows' Fund ten years previously.

I find, from a table given in the 2nd volume of the *Assurance Magazine*, page 360, that the total annual income of the first mentioned Company is about £180,000; and, from the same source, that the income of the latter Company is as much as £306,500 annually. I mention this to show the important character of these two Societies; and that, from the

\* Noticed in No. XIII. of this *Journal* (see page 76).—Ed. A. M.

extent of their operations, their experience in respect of mortality must be quite adequate to the deduction of valuable results.

I should have been glad to have been enabled to furnish a comparative table of the results of these two investigations; but after taking some trouble in the matter, I found that, for several reasons, this could not be satisfactorily done—one great disturbing cause, after the reconciliation of other anomalies, being, that the mortality experienced in each year under observation differs so very materially, the whole period embraced being only the short space of seven years; it being explained that the returns for the years antecedent to the last seven are of a nature not sufficiently perfect to warrant the deduction from them of results which could be depended upon, and the periods chosen by the two Companies not being identical.

There are other disturbing causes likewise, which I shall now proceed to enumerate, with respect to the classification of the causes of death. I shall follow the nomenclature of the Registrar General, and preserve the same order as that adopted in his returns.

1. *Diarrhœa and Dysentery*.—In the return of the Standard, these two diseases are classed together. Severe diarrhœa so often assumes the form of dysentery, that the line of demarcation between the two complaints is difficult to draw, and the deaths from these causes are accordingly often erroneously returned.

2. *Diarrhœa and Cholera*.—The same remark applies to these diseases; and in these cases, the desire on the part of some medical men, particularly in time of alarm, to allay the fears of the public, induces them to make light of so dreaded a disease as cholera, and thus conduces to erroneous returns; on the other hand, medical men of an opposite disposition may similarly magnify the number of cases; and this from no desire on the part of either class to give an erroneous impression, but simply from the bias of the individual, depending upon his peculiar idiosyncrasy: and diarrhœa so often simulates cholera so much as to afford great scope for this description of error.

3. *Erysipelas*.—This complaint is not generally a primary disease, but frequently supervenes after accidents and operations, and is accordingly only a secondary cause of death.

4. *Hæmorrhage*.—This is a very vague term. Hæmorrhage may be produced by internal disease or by external causes.

5. *Dropsy*.—This too is not usually a primary disease, but arises in certain stages of other complaints.

6. *Cancer*.—There are many parts of the body that this fearful disease selects for its attacks.

I imagine, from the smallness of the numbers returned under this head by both Companies, that this complaint has been returned as a disease of the part affected—that is, for example, that *carcinoma pylori* has been returned as disease of the stomach, *carcinoma uteri* as disease of the womb, and so on.

7. *Phthisis*.—Under this head the same remark applies, many cases of this disease being included under the head “diseases of the lungs.”

The difficulty of obtaining correct returns as to this complaint is very great. Take a very common case. A man is seized with pneumonia; he recovers, but his cure is more apparent than real, as some organic lesion has taken place. He ruptures a bloodvessel in the lungs, and shortly

phthisis supervenes, and he dies of a rapid decline in the course of a few weeks. This death may be reported in three different ways—1, under the head “pneumonia,” the primary cause of the mischief; 2, under the head “hæmorrhage”; 3, under that of “phthisis”; and it is often difficult to say positively which is right: for, on the one hand, the tendency to phthisis may have led to the fatal result from pneumonia; and, on the other, the pneumonia, which may have arisen from purely local and accidental causes, may have created organic injury in a subject not in any way predisposed to pulmonary disease.

8. *Apoplexy*.—In cases of death from this disease, which is generally quite sudden, the true cause of death is in many cases not arrived at. Of course when a *post mortem* examination is made, the autopsy will show whether the brain or the heart was at fault; but in how many cases out of the immense numbers that fall victims to this disease is a *post mortem* examination performed?

9. *Paralysis*.—This disease, too, is often a secondary stage of other primary complaints.

10. *Delirium Tremens and Drunkenness*.—Deaths under these heads are mostly from the same cause.

11. *Mania and Epilepsy, Insanity, and Suicide*.—The returns under these heads are very likely to be confounded. Lunatics often die of epilepsy; most suicides are committed by persons when in an unsound state of mind.

From these considerations, then, I am reluctant to draw any comparison between the two Companies which might prove invidious to either, and might warrant the assumption that one Company had been less cautious in the selection of lives than its compeer.

In perusing these papers, the most cursory reader could not fail to be struck by the great predominance of deaths at the young ages from phthisis and other pulmonary diseases, at the older ages from apoplexy, and at all ages from fever.

Now with respect to the first of these diseases, phthisis, it is unhappily too well known that, so sudden and so capricious are the ravages of this complaint, selecting as it does certain members of a family for its attacks and passing over others, without any apparent cause, that the utmost care in the examination of lives proposed for assurance is not sufficient to protect the Company. It would seem that, from the fact of this disease being in its nature so likely to be hereditary, that what they have principally to trust to is the careful inquiry into the family history of the applicant. Assurance Companies are now on their guard in this respect, and some Companies make a point of declining, as a rule, all young lives—say, lives under 40—in which there has been even one case of consumption among the immediate relations of the life proposed. There are, of course, cases where a brother or sister may have died of this disease, in which the exciting cause may be clearly traced, and in which there may be no hereditary taint; but even in these cases the utmost caution is necessary, for there is a peculiar anxiety evinced (all interested motives apart) to find a reason, an excuse, for the death of a near relative from this dreaded hereditary disease.

That Assurance Companies are now fully aware how much they are dependent upon full information as to the family history of the lives pro-

posed, the nature of the documentary evidence now required to be furnished very clearly shows.

I must here remark, that Dr. Christison asks, rather unfairly, "whether the older Assurance Companies are right in still adhering, as many" he says "do, to the old form of inquiry, according to which the certificates convey only the most imperfect medical history of the proposer himself, and next to nothing as to that of his immediate relatives."

I have been familiar for several years past with the forms in use by most of the older Assurance Companies, and it has been within my own personal observation that their forms have been from time to time modified and improved, as circumstances required and experience suggested, until I should think there was but little scope for improvement; the amendment to which I allude, moreover, tends precisely in the direction pointed out by the pamphleteer.

It is satisfactory to find that the deaths from diseases of the respiratory organs among the members of the Scottish Widows' Fund, in the present investigation, amount to only  $18\frac{3}{4}$  per cent. of the total mortality; while in the preceding investigation, in 1847, the ratio was  $23\frac{3}{4}$  per cent.; the difference arising, it is stated, from the diminished mortality from consumption, which result no doubt was produced by the care taken in the selection of lives, having reference especially to minute inquiry into the family history of the applicants. Nor must it be considered that this diminution has arisen from deaths from this cause having been registered under other heads, such as "disease of the lungs," &c.; for it appears that the number of deaths from diseases of the lungs, not of a tubercular origin, has been smaller during the quinquennial period under consideration than in the preceding.

Dr. Begbie sums up a very interesting and highly important inquiry into the circumstances connected with the acceptance of the cases which eventually proved consumptive, with the expression of a hope that the consideration of these cases will lead the Board of the Scottish Widows' Fund in no degree to relax the rule under which they have acted for many years past, of rejecting all applicants in whose immediate family more than one case of tubercular consumption has manifested itself; the more so if the proponent be under 45 years of age. "The daily experience of the Society," he adds, "will lead the Board to view with increasing suspicion the proposals of those who, though sound in themselves, are called to acknowledge that a father, and particularly a mother, a brother, or a sister, have been affected with or carried off by this fatal disease."

The returns of the Standard Company do not so readily admit of a comparison of the relative per centages of diminution of this disease in the present quinquennium; but it is clear that, though a considerable number of lives have been prematurely cut off by phthisis, very many of this number would not have been admitted under the system now followed. Like the Scottish Widows' Fund the Standard Company do not consider that a single death from consumption in the family of the proposed life is in itself a sufficient reason for rejection, but their experience tends to show the necessity for extreme caution, even in these cases.

It does not appear, from these investigations, whether in doubtful cases the Companies in question accept the assurances at an increased rate of premium. I should think, however, from the absence of any information on this point, that they do not.

It is quite clear that in these cases, when say one death has occurred in the family from pulmonary disease, if the life be taken and does succumb to this disease, the death happens in most cases so very long before the due expectation at the age that no small extra premium, such as some Companies are in the habit of accepting in these cases, would be the least protection against loss; such extra charge, if made at all, should be extremely high—so high, in fact, as almost to preclude the idea that the proposer would complete the assurance. The practice, I believe, of most of the Offices of standing in London, is either to accept or decline in these cases, rarely requiring an extra premium.

The same mastery that consumption has over young lives, apoplexy and its cognate diseases maintain over those more advanced in years.

The deaths from this class of diseases form a large proportion of the total mortality of the two Companies under review.

Though we have not in apoplexy a disease so decidedly hereditary as consumption, and are accordingly deprived of the aid to our judgment which an inquiry into the family history might afford, still there are certain indications, well known to medical men (but which it would not fall within the scope of this letter to discuss), to assist in influencing the selection of lives; and though the mortality from this class of disease has been very great, yet there is every reason to suppose that, under the present system adopted by the two Companies, many policies which prematurely became claims would not have been issued.

The space I am consuming reminds me that I must proceed to the third large class of diseases, previously referred to, which tells so much upon the mortality of Assurance Companies, and which affects lives of all ages—I mean, fever.

This disease is unquestionably very much in our own hands. In a paper I had the honour of reading before the Institute of Actuaries in November last, I alluded to the almost entire check that has been given to this disease by the exertions of the Metropolitan Association for the Improvement of the Dwellings of the Industrious Classes, so far as refers to the districts under their control. A public meeting of this Association took place on the 25th of February last, with the view to consider the best method of extending the operations of the Society. Mr. Hubbard, the Governor of the Bank of England, in the course of an address to the meeting, after speaking of what had been done for the social and intellectual advantages of the labouring classes, by the building of churches and the establishment of schools, stated his opinion that these would be in vain if their influence was to be counteracted by that of the wretched abodes where filth and disease ever prevailed. The Society, he added, would lead the way in improving the dwellings of all classes. Lord Stanley, also, speaking of the wretched condition of the labouring classes in the metropolis, mentioned that it had been stated, that in a small lane near Oxford Street, 12 houses contained no less than 461 persons, and that the quantity of air enjoyed by each was only one seventh or one eighth of the quantity requisite for one individual.

Now, in the face of such facts as these, can anyone be astonished at the spread of contagious disease? And does it not seem probable that, even in a pecuniary point of view alone, it would be worth while for Assurance Companies to take their share in these philanthropic undertakings? By the extension of sanitary improvements, disease may be very much prevented;

and Assurance Companies would not only obtain a profitable rate of interest for their investments, but would be undoubted gainers in process of time by the diminution of their mortality.

That these will be *paying* institutions there can be no reason to doubt. The Society of which I am now speaking has a capital of £100,000, with power under their charter to increase the amount, if necessary; and a dividend of 5 per cent. is confidently looked forward to. As an evidence of the satisfactory state of the Institution, I may mention that it appears that, since the commencement of operations, the receipts have been £15,000, and the bad debts have not amounted to £40.

The necessarily restricted space of the *Magazine* will not admit of a further pursuit of this subject.

The pamphlets under consideration suggest many interesting points of inquiry, which I have not been able to touch upon—as, for instance, the connection between diseases of an unimportant character primarily, and those of a deadly nature—between rheumatism and disease of the heart, between the latter and dropsy; and so on. With respect to dropsy, which is not a primary disease, but is usually symptomatic of some other disease, it will be found that, the more correct the returns obtained by the Office, the less the number will appear that have died of this disease; and similarly of other heads, such as palsy, paralysis, and “unknown causes:” and, conversely, the smaller the numbers under these heads, the more correct and precise are the returns likely to have been, and, accordingly, the more satisfactorily will the business of this Office appear to have been conducted, and the more faith and confidence can we place in the results. The return of deaths from “natural causes” is very far from satisfactory, unless the age was very advanced.

It will be seen, I apprehend, from the foregoing observations, that these investigations are of a most important character; and the careful manner in which they have been conducted affords the best evidence of the progress that is now being made in life assurance statistics. These papers are worthy of careful study, not only by the medical examiners, but by the actuaries also, of all Life Assurance Companies.

We may deduct from them the following important considerations:—

1st. The necessity for as strict an inquiry into the family history of the life proposed for assurance as into the present and past state of health and habits of life of the individual himself.

2nd. The extreme importance in all cases of the use of the stethoscope, and of the careful examination of lives proposed for assurance, in every case, by competent medical practitioners; and,

3rd. That the improved methods of inquiry now so general among respectable Companies, and the advances which are constantly being made in the knowledge of the causes and effects, and in the diagnosis, of disease, though they cannot be expected to tell with effect upon the business of a Life Assurance Company for some time to come, must eventually tend to reduce the mortality of such Societies.

I have the honour to be, Sir,

Your obedient Servant,

H. W. PORTER.

*Alliance Assurance Office, London,  
1st March, 1854.*

METROPOLIS.—Table showing the Mortality for the Year 1853, and in each Week  
Districts in which the Deaths occurred, the Temperature and Meteorology.

[Extracted by permission from the Registrar-General's Reports.]

DATE.		ZYMOTIC DISEASES.	CHOLERA.	SPORADIC DISEASES.																BIRTHS.		
Weeks ending				1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	Males.	Females.	Males.
1853.																						
JANUARY	1	228	3	66	189	170	65	191	58	16	6	9	2	4	31	21	46	43	155	987	924	713
"	8	206	..	47	151	115	43	174	56	13	6	11	4	3	27	23	47	7	25	724	715	457
"	15	216	..	49	177	119	37	153	69	6	10	9	4	3	39	25	41	4	15	755	841	492
"	22	196	..	49	198	115	36	171	56	9	10	8	3	4	29	26	40	5	17	790	787	494
"	29	197	..	42	189	106	42	199	62	14	6	7	7	3	33	24	50	5	24	902	810	511
FEBRUARY	5	231	2	47	208	135	43	250	77	15	8	13	1	..	44	29	77	7	33	827	732	648
"	12	212	..	56	194	147	46	312	56	18	16	10	1	4	27	17	59	7	41	849	804	622
"	19	224	..	51	229	140	44	331	66	20	5	13	1	8	25	28	93	6	40	850	733	618
"	26	201	..	37	198	147	56	371	52	15	10	12	5	5	36	37	87	7	50	846	816	666
MARCH	5	244	1	59	216	160	60	388	58	13	12	8	3	4	24	33	82	10	35	861	810	723
"	12	244	..	44	231	154	57	391	68	26	13	10	8	4	35	36	57	7	51	892	924	740
"	19	229	..	50	189	152	59	332	72	11	3	8	3	6	26	28	57	8	37	855	812	632
"	26	233	1	43	217	145	55	322	71	12	13	4	3	5	29	39	45	10	53	752	728	658
APRIL	2	273	1	82	235	175	68	420	75	17	8	11	5	1	32	45	69	56	163	1005	904	846
"	9	253	1	51	244	158	47	326	66	16	9	11	2	3	29	40	56	6	21	791	800	708
"	16	219	1	57	230	135	51	251	69	8	4	10	1	4	37	28	51	3	45	853	826	666
"	23	218	1	50	211	137	54	242	74	17	14	11	1	6	22	39	43	4	22	812	768	612
"	30	227	1	46	222	117	50	206	60	11	9	6	1	2	20	34	47	3	24	852	770	532
MAY	7	217	..	64	203	125	50	224	80	8	9	3	3	7	37	35	35	11	42	816	755	609
"	14	235	..	45	212	115	49	199	70	16	7	10	..	2	32	43	37	..	23	870	806	596
"	21	239	..	50	226	121	34	174	71	9	1	13	1	3	25	26	22	11	41	791	776	610
"	28	229	..	38	235	155	45	162	61	15	9	7	2	4	30	32	34	7	33	782	779	574
JUNE	4	219	1	46	209	121	50	129	73	10	6	8	5	4	19	36	22	9	53	758	686	522
"	11	228	..	51	206	104	44	136	58	13	12	10	2	2	29	42	35	4	24	740	768	518
"	18	208	..	39	179	106	29	127	59	8	5	7	2	4	24	40	39	6	32	742	667	477
"	25	214	3	46	190	113	41	116	69	10	6	11	5	2	20	39	32	8	66	805	740	522
JULY	2	203	..	49	217	101	52	121	60	18	8	6	2	4	39	40	33	22	116	856	855	629
"	9	211	..	55	190	95	30	84	72	14	10	4	2	4	35	29	36	4	37	709	735	473
"	16	225	3	42	209	91	31	87	58	16	5	6	1	1	31	33	35	4	22	716	651	457
"	23	226	6	47	226	94	38	102	70	10	11	4	2	2	22	30	20	6	36	819	741	504
"	30	270	9	32	203	128	38	79	59	13	16	8	2	1	34	30	38	5	48	769	752	537
AUGUST	6	279	4	40	192	119	27	97	71	16	6	9	1	2	32	41	22	4	23	769	779	510
"	13	320	19	38	196	89	29	77	44	22	5	8	3	2	21	51	23	4	39	709	752	537
"	20	293	10	51	194	110	41	93	69	10	9	6	6	6	26	47	45	4	22	775	743	533
"	27	277	18	55	189	105	34	99	60	18	10	5	1	6	31	49	38	1	28	803	683	514
SEPTEMBER	3	315	16	47	171	115	41	86	62	14	4	9	1	1	29	31	39	3	52	805	777	519
"	10	297	7	45	177	130	35	94	68	21	10	3	3	4	36	33	30	3	18	843	826	537
"	17	252	16	37	170	104	35	104	58	15	10	8	1	2	31	29	28	13	42	816	690	477
"	24	288	29	37	161	92	34	123	64	10	9	4	1	5	29	40	42	3	25	824	795	457
OCTOBER	1	306	48	49	173	147	43	112	47	16	6	8	2	4	31	28	39	31	160	824	800	477
"	8	324	66	51	155	106	31	136	55	20	3	4	1	1	16	46	33	2	9	727	648	427
"	15	291	45	50	173	98	39	150	61	17	10	8	4	5	24	34	40	7	23	812	761	509
"	22	306	83	44	153	110	39	165	68	11	10	5	2	3	28	39	30	6	32	813	720	536
"	29	344	96	45	169	108	34	200	52	12	8	7	..	5	38	35	36	5	31	817	800	527
NOVEMBER	5	331	102	46	176	112	38	158	59	10	4	5	3	2	30	38	43	5	29	847	811	567
"	12	349	98	47	196	128	36	189	62	12	13	11	2	7	25	31	33	5	44	866	748	617
"	19	321	72	52	184	126	44	180	63	13	12	11	2	3	30	32	42	1	38	814	747	606
"	26	311	46	50	215	155	59	297	51	12	8	6	3	3	42	35	50	7	27	777	665	534
DECEMBER	3	301	28	46	222	131	59	379	71	17	8	8	1	3	42	24	70	5	22	840	837	718
"	10	277	13	50	208	123	52	343	49	12	12	8	3	5	26	30	56	6	29	838	790	658
"	17	268	11	52	198	151	47	319	65	22	6	8	3	1	51	29	70	12	34	771	786	723
"	24	230	10	60	202	131	45	316	67	13	11	10	..	4	36	31	68	21	91	800	745	743
"	31	297	10	65	202	186	63	347	58	13	7	7	1	6	35	45	77	54	159	791	775	861
Total, 1853 { (53 weeks)		13562	881	2587	10509	6672	2349	10831	3349	743	448	426	124	189	1611	1805	2428	497	2401	42967	40591	37000
Total, 1852 { (52 weeks)		12104	162	2361	9815	6001	2156	8135	3235	657	473	446	130	197	1572	1336	2315	431	2140	41038	39446	37000

The figures heading the *Sporadic Diseases*, signify as follow:—1. Dropsy.—2. Tubercular Disease.—3. Diseases of the Lungs and of the other Organs of Respiration.—4. Diseases of the Stomach, Liver, &c.—5. Rheumatism, Diseases of the Bones, Joints, etc.—6. Diseases of the Skin, Cellular Tissue, &c.—7. Violence, Privation, Cold, and Intemperance.



*the several Diseases, Births, and Deaths of Males and Females, Age at Death, the Increase of Population. Compiled by MR. B. SMITH.*

[*Medical Times and Gazette.*]

TOTAL DEATHS.	BIRTHS OVER DEATHS.	AGES AT DEATH.			DISTRICTS.					Mean Height of BAROMETER.	THERMO-METER.		Difference between the Temperature of the Week & the same Week on average of 7 Years.	General Direction of the Wind.	Amount of Horizontal Movement of the Air.	Rain in Inches.
		0 to 15.	15 to 60.	60 and upwards.	West.	North.	Central.	East.	South.		Dry.	Dew Point.				
1308	603	568	470	268	171	240	220	335	342	29-643	47.5	38.6	+ 10.1	S.W.	1545	0.43
965	474	432	319	209	140	188	164	208	265	29-485	45.3	39.5	+ 9.7	S.W.	970	0.71
1001	595	477	314	188	143	192	169	202	295	29-443	45.0	38.0	+ 9.6	S.W.	1300	0.45
994	583	446	327	199	156	191	172	209	266	29-468	41.9	35.4	+ 5.4	N.W. & S.W.	840	0.59
1011	701	451	324	235	149	209	190	219	244	29-750	37.7	31.8	+ 0.5	N.E.	320	0.007
1220	339	550	391	278	193	244	195	296	292	29-782	36.5	31.5	+ 1.3	Calm.	270	0.20
1235	418	479	452	293	209	260	205	249	312	29-225	34.8	29.2	- 3.6	S.E. & N.N.E.	620	0.06
1238	253	534	424	370	207	272	222	275	352	29-585	29.8	22.9	- 9.1	N.	540	0.33
1244	318	541	427	359	220	264	230	287	343	29-679	33.8	27.0	- 5.7	N.	895	0.39
1247	244	573	460	379	199	272	257	334	365	29-663	35.3	29.2	- 4.6	Variable.	385	0.68
1436	380	600	466	369	214	266	292	324	340	29-926	44.6	38.7	+ 4.4	Calm.	345	0.17
1274	393	588	394	291	159	286	243	288	298	29-685	36.6	30.1	- 5.0	N.E.	450	0.51
1281	159	598	420	284	194	259	248	259	361	29-762	33.3	26.6	- 9.0	N.E.	315	0.10
1748	161	719	595	419	246	331	325	402	444	29-733	43.4	32.8	+ 0.1	Variable.	780	0.44
1240	251	621	411	307	190	227	259	300	364	29-742	47.3	40.1	+ 3.0	W.	160	0.44
1243	436	538	419	247	181	256	221	262	323	29-943	44.4	35.6	- 1.1	N.E. & N.W.	545	0.02
1182	398	540	385	243	179	234	184	270	315	29-694	45.9	39.5	- 1.1	Variable.	765	0.90
1089	533	507	357	223	157	216	161	235	320	29-671	42.5	37.4	- 1.1	Variable.	680	1.32
1159	421	561	355	239	162	215	214	283	285	29-773	47.9	43.4	- 3.8	E.S.E. & N.E.	675	0.84
1099	577	546	348	204	149	218	190	237	305	29-760	45.3	37.4	- 6.6	Variable.	795	0.37
1098	469	504	383	195	162	184	201	231	320	29-760	55.2	45.5	+ 2.1	N.E.	605	3.00
1128	433	505	372	220	169	226	147	255	331	29-696	59.7	48.8	+ 4.7	N.E.	575	0.13
1028	421	465	354	198	158	225	137	201	302	29-880	51.8	45.5	- 4.8	N.	620	0.42
1007	501	453	360	189	166	198	154	212	277	29-806	60.8	49.0	+ 2.9	S.W. & S.E.	320	0.24
924	485	440	303	174	136	195	143	203	247	29-798	58.3	51.2	- 1.0	N. & S.W.	655	1.30
990	555	487	326	176	179	173	176	207	255	29-597	57.4	49.7	- 3.1	Variable.	690	0.55
1108	608	477	389	221	134	205	170	286	308	29-578	59.1	50.9	- 2.4	S.W.	1310	0.89
925	619	425	305	185	129	193	157	207	239	29-883	64.1	56.1	+ 1.9	S.W. & S.	810	0.88
904	463	473	286	141	128	161	155	198	262	29-598	58.7	50.1	- 3.3	S.W.	890	3.14
971	589	468	324	156	177	175	158	209	252	29-745	59.6	51.8	- 2.2	S.W.	710	0.29
1004	517	474	342	186	132	207	182	210	273	29-696	60.3	52.5	- 1.8	S.W.	800	1.39
991	557	511	289	181	141	213	151	219	267	29-876	61.6	51.4	- 0.5	S.W. & Calm.	300	0.01
984	477	518	283	172	163	184	156	197	284	30-072	61.2	52.7	- 0.6	.....	155	0.00
1038	465	580	319	204	140	231	165	217	300	29-736	60.4	54.2	- 0.6	N. & S.W.	370	0.59
1021	465	518	315	187	164	197	213	196	251	29-543	58.6	53.0	- 1.5	S.W. & N.	785	1.50
1029	553	520	317	191	148	199	188	228	266	29-732	55.7	50.0	- 3.3	S.W.	768	1.03
1015	534	521	323	163	146	229	137	201	302	29-967	56.1	51.2	- 1.8	N.	420	0.22
949	557	453	316	174	128	173	148	235	265	29-887	57.6	52.5	+ 0.7	.....	355	0.57
969	550	485	299	185	122	180	141	242	284	29-826	54.6	49.2	- 0.8	W.	625	0.19
1212	412	547	423	235	151	224	171	301	365	29-636	52.4	47.1	- 1.6	S.W.	890	0.69
1001	374	489	335	173	146	189	154	205	307	29-514	48.6	45.0	+ 1.2	Variable.	355	1.03
1039	534	511	342	184	147	192	171	233	296	29-587	52.0	49.8	+ 4.0	Calm. & N.E.	205	0.94
1034	409	531	332	187	142	197	151	263	301	29-357	48.6	45.9	+ 0.7	S.W.	865	1.10
1144	473	579	382	170	168	215	159	267	335	29-690	55.5	51.5	+ 7.7	.....	670	1.46
1112	546	552	361	176	146	213	174	229	350	29-633	48.9	45.3	+ 2.8	S.E.	625	0.08
1192	422	617	387	187	185	221	153	291	342	30-155	45.7	43.3	+ 1.2	Calm.	265	0.06
1162	399	609	339	214	168	228	158	278	329	29-723	38.5	36.2	- 4.3	Calm. Variab.	280	0.13
1339	103	652	409	278	195	220	199	315	410	29-995	36.7	35.8	- 5.1	Calm.	280	1.25
1414	363	620	481	306	153	306	221	319	375	29-954	40.0	38.7	- 1.7	.....	380	0.05
1308	320	579	418	296	196	337	210	304	361	30-001	39.8	38.0	- 0.5	.....	230	0.13
1382	199	638	388	311	202	250	205	328	373	29-512	32.7	29.4	- 7.3	N.E.	525	0.12
1399	146	595	477	326	229	221	249	306	394	29-748	33.1	30.6	- 5.6	N.E.	425	0.10
1556	-90	700	539	387	229	318	266	420	423	29-835	29.0	24.7	- 8.4	.....	220	0.16
1202	22676	28305	19976	12532	8937	11819	10081	13687	16678							
1213	26271	25659	17783	10496	8295	10670	9324	11449	14475							

ases of the Brain, Spinal Marrow, Nerves, and Senses.—4. Diseases of the Heart and Blood-vessels. Organs of Digestion.—7. Diseases of the Kidneys, etc.—8. Childbirth, Diseases of the Uterus, etc.—Malformations.—12. Premature Birth and Debility.—13. Atrophy.—14. Age.—15. Sudden.—

*Comparative Losses of Life from War and Pestilence.*—The following statement is made up from official returns for the use of the General Board of Health. We insert it as affording useful information to Offices, at the present epoch.

## DEATHS BY WAR.

Official returns of the number of persons killed and wounded, both in the army and navy, in 22 years of war:—

Killed						19,796
Annual average—Army	.	.	.	.	.	733
Navy	.	.	.	.	.	166
Total annual average	.	.	.	.	.	—899
Wounded	.	.	.	.	.	79,709
Annual average—Army	.	.	.	.	.	3,151
Navy	.	.	.	.	.	472
Total annual average	.	.	.	.	.	—3,623

## Losses in particular battles:—

	Killed.	Wounded.
Waterloo (total British killed on the field)	1,771	5,892
Salamanca	888	2,714
Vittoria	501	2,807
Talavera	670	3,406
Lord Howe's victory	287	806
Trafalgar	449	1,214
Nile	218	677
Copenhagen	254	689
Barossa	202	1,040

Sir Richard Henegan, formerly head of the field train department of the allied armies under the command of the Duke of Wellington, states, in a work narrating his military experience during seven years' campaigns throughout the Peninsular war—"Allowing half the shots served out to have been fired at the battle of Vittoria, 3,675,000 rounds were fired against the enemy, of whom 8,000 were killed or wounded; consequently only one musket-shot out of 459 took effect: and this calculation excludes the injury inflicted on the enemy by 90 pieces of artillery, which on the average fired 73 rounds of shot and shell each, making a total of 6,870 rounds. The cavalry were but slightly engaged during that day." At every battle in the Peninsula, except Barossa, the author remarked the same undue expenditure of ammunition in relation to the small extent of damage.

The official returns show that during the last 41 months of the Peninsular war, whilst 24,930 privates died of disease, only 8,999 died of wounds or were killed in battle. The deaths during the campaign were—of the privates in battle, 42 per cent.; of disease, 11·9 per cent.; of officers in battle, 6·6 per cent.; of disease, 3·7 per cent., per annum. The average deaths in four battles, Talavera, Salamanca, Vittoria, and Waterloo, were 3·9 per cent. of officers, 2·11 of privates.

In the Peninsular war there were generally 22½ per cent. of men absent on account of sickness; and a reduction of the proportions of sick to 6 per cent., would have set free 10,000 men from the hospitals to be added to the effective force of the army.

The highest increased charge for insurance of military men during the Peninsular campaigns was 10 guineas per cent. The extra premiums taken on the insurance of military lives in service in India and China are from three to five guineas per cent.; governed, however, by the unfavourable chances of the climate to which the campaign leads, as well as by the increased risks from battle.

The extra premiums on naval officers in hostile service is usually from three to five guineas per cent., governed by the consideration of the climate.

## DEATHS BY PESTILENCE.

The total number of persons killed by cholera and epidemic diarrhoea in 1848 and 1849, in England and Wales, was 72,180. Of these, 34,397 were able-bodied persons, and of an age to get their own living, being between the ages of 15 and 60. But it is known that there was much omission and falsification of returns, and that these amounts are under-statements of the fatality of the disease.

The number of attacks from cholera is estimated at 2 attacks to 1 death; the number of the former would therefore be 144,360. Of these, so many are permanently reduced in strength as to be made more susceptible to the prevalent causes of disease, as to be subjected to premature deaths—equivalent to the premature deaths and wounded in battle.

The average annual deaths from preventible (*i. e.*, typhus and other zymotic) diseases, from which well managed public establishments and improved dwellings are kept clear, were 115,000.

The annual deaths from other causes, eventually preventible in civil life—*viz.*, those by violence, by improvement in the education and industrial training of manual labourers, rendering them more discreet by improvement in the arts; rendering processes and engines more safe; and by moral, religious, and physical training of intellectual labourers less liable to mental aberrations and to suicide—these deaths are from year to year nearly as they were returned in 1849, *viz.* :—

Fractures . . . . .	4,170
Burns and scalds . . . . .	2,761
Drowning . . . . .	2,433
Hanging and suffocation . . . . .	1,069
Wounds . . . . .	542
Poison . . . . .	444
	<hr/>
	11,419

or more than eleven times as many as the average loss of life in battle.

Losses from cholera and diarrhoea in particular districts, 1848, 1849 :—

Metropolis, 1848 and 1849—	
Cholera . . . . .	14,139
Diarrhoea . . . . .	3,849
	<hr/>
Total . . . . .	17,988
Of these 8,903 were able-bodied persons.	
Newcastle, 1853.—Cholera . . . . .	1,543
Gateshead, ditto . . . . .	560
	<hr/>
Total . . . . .	2,103

On the medical inspectors being sent from the General Board of Health to make preparations in the West Indies against the threatened visitation of the Asiatic cholera, application was made for insurances, but none could be obtained from any respectable Office in London under less than 12 per cent. on the amount insured. Of the three, one was so reduced by the climate that he died immediately on his return, and another had a dangerous attack of yellow fever.

Of the medical men engaged in the actual visitation and treatment of the severe epidemics, as many as 12 per cent. have died. In some instances as many as 20 per cent. have been killed.

The Secretary of the London City Mission Society states, that though the missionaries have many of them previously been born and bred in poor districts, and accustomed to hard and trying labour, a considerable number of them are continually laid aside, and very many who promised best have to give up altogether in a few years. Indeed, very few of them, with all these advantages, can stand many years' work on the really bad districts of London, although 36 hours' visiting each week is all which is required of them.

We sustain as much loss of life and health in prosecuting missionary work in London, as those societies do the object of which is to send missionaries to foreign parts, many of which are notoriously unhealthy. This is a reproach to the metropolis of our country. There are some districts respecting which we almost feel sometimes a question whether we ought to expose the health and life of men by placing them on them; and there are other districts on which missionary after missionary has broke down, when located there; while even in a large number of our districts, the energy, strength, and vigour of our missionaries become impaired by their constant exposure to impure air.

The widowhood and orphanage from pestilence, inasmuch as there is always a large proportion of married adults attacked, are immeasurably greater in proportion to the gross number killed than in war. In 1842, on an enumeration, it appeared that there were 27,000 cases of premature widowhood, and upwards of 100,000 orphans then chargeable to the poor rates, from preventible causes. In the returns from 12 Unions, where there had been 11,170 deaths from cholera, it was found that there were 3,567 widows and orphans chargeable to the epidemic cholera of 1848-49; and an expenditure, for only four years' relief, of £121,000. In the same proportion for the whole of the 72,000 deaths, the total number of widows of the class falling into destitution would be 23,000, and the four years' charge of them £780,000.

The total expense of funerals is estimated at £500,000, and the total private as well as public expenses of that one epidemic at not less than two millions, notwithstanding extensive checks and mitigations.

Taking as the test of the obtainable rate of mortality the rate obtained in good old dwellings improved by self cleansing drainage works, as well as by improved supplies of water—as well as in the new model dwellings (namely, 13 in 1000, the common average of the whole kingdom being 23 in 1000)—the total annual losses from preventible disease, from lost labour by premature death, and excessive and premature sickness, and the expense of excessive numbers of funerals, is under-estimated at 12 millions per annum, or about the total annual charge of the entire army and navy.

## REVIEWS OF NEW WORKS.

### *Twelfth Annual Report of the Registrar General of Births, Deaths, and Marriages, in England.*

THE Reports made to the Government from time to time by the above-named officer, contain, as is well known, matter of the highest public interest and importance, and would be invaluable for many purposes, were they unaccompanied with any extraneous information. But they are rendered of still greater value by the letters appended to them from Mr. Farr, whose labours as a statistician and, as we believe we may say, an amateur actuary, are now familiar to the public. The present Report has one of these letters, touching upon almost every question connected with the rates of mortality, sickness, and interest of money—the calculations founded upon them—the constitution and management of Assurance Societies—the adaptation of life and health assurance to the wants of the poorer classes—the nature of deposit assurance—and, in short, the whole subject, briefly, it is true, but in its widest comprehensiveness.

The letter commences with observations on life tables, and a comparison of the principal ones with those formed by Mr. Farr. The defects of the Northampton Table are pointed out; and in reference to them Mr. Farr says—

"Great injustice has been done by the use of this Northampton Table; which, in mutual Offices, makes one member pay 40, 30, 25, 20, 10 per cent. more than the premium which is required to secure a policy of the same value, and distributes the surplus thus acquired unequally. The old Offices, which have used the Northampton Table, have a great difficulty in setting themselves right. By its use the proprietary Offices have exacted enormous and unequal premiums from the portions of the community who happened to be ill versed and ill instructed in the intricate science of life insurance.

"A false life table can be defended by the same arguments as a depreciated currency; and the substitution of a correct table causes the same kind of disturbance in the value of the shares of members as a recoinage of clipped money, or a return from a depreciated paper to a metallic currency, introduces into the value of commodities and securities. The Northampton Table has still silent adherents, but few open defenders; and some of the old Offices have, greatly to their credit, since the error in that table has been placed beyond doubt, abandoned its use."

The discussion of the merits and defects of these life tables leads to observations on the rates of premium charged, and to comments on their great variety.

Speaking of Life Insurance Offices, the author says—

"A Life Insurance Office is a bank, in which deposits are made every year, to be withdrawn at the death of the depositor; it is a lottery reversed, as for unequal sums it sells equal prizes; it is a trading firm, in some cases seeking partners every year, and always seeking customers; it is a company of capitalists constantly looking out for long investments, and well organized, to deal profitably in securities at some greater risk than those returning 3 per cent. interest.

"The commercial balance-sheet, in the most correct form, fails to present a correct view of the condition of a Life Office transacting ordinary business, as its liabilities are distant, contingent, and every year varying in value."

He proposes to use the term 'insurer' for the party granting the "insurance," and 'insuree' for the one whose life is concerned.

"The *insuree* performs two functions; which are separated where a third party (*insurant*) procures the policy, and pays the premiums. Under one aspect the same person is the *insuree*, under another he is the *insurant*."

The three kinds of Offices are described, and the writer then comes to the important question of the "determination of the financial condition of Life Offices." He describes the old method of valuation, as practised with the Northampton Table, and continues—

"Under this mode of valuation, as the premium is assumed to be net, no allowance is made for expenses of management, or for any contingencies which are left uncovered by the life table. By the Northampton Table, which Mr. Morgan used, the value of the sums insured is overstated, and the value of the future premiums is understated; so the stock which is required to meet the future contingencies comes out, by a similar calculation, at £3,817,530. For the premium has by that table a latent charge, irregularly laid on, and its errors, in the particular case, are on what has been called the safe side.

"This method of valuation, which is sanctioned by the books on insurance, is defective, as it leaves out of account the charge on the premium, and the purposes to which that charge is destined. An Office that had expended nearly the whole of its premiums, and had no stock, or very little, advertised a profit of some such sum as £96,000, which was probably the capitalized value of *the charge* on the future premiums. This paradoxical result flows directly from the principle of valuation which the books sanction."

Again:

"It is urged by one class of actuaries that the *charge* should not be brought into account; and what I have said hitherto is in accordance with this view. Other actuaries take the opposite view.

"The object of these investigations is twofold:—

"To determine the financial condition of the Society at a given date, and to learn to what extent its liabilities or its assets are in excess;

"To show what portion of any existing surplus in the assets is fairly available and disposable as realized profit.

"It is evident, in the first instance, that in a Society of any extent all the chances of mortality are, or should be, provided for by the life table; and that all the risk of investments is covered by taking the rate of interest so low as 3 per cent. Therefore, after deducting the cost of management from the charge on the premium, the rest of that charge may be fairly viewed as a probable surplus, as it is indeed assumed to be in fixing the rates of premiums either of a mutual or of a proprietary Life Office. To recur to the Equitable valuation, some of the Offices realize, on an average, 4 per cent. interest on all their investments; if the Equitable count on this rate of interest, it would require £2,959,597, with the future premiums—for which it has the absolute security of its creditors—to enable it to pay off its policies as they fall due. The assumption that its investments will only return an interest of 3 per cent. makes its required capital, by the English Table, £3,479,275, or half a million more than the sum which may possibly be sufficient. The cost of carrying on this great Office is apparently about £10,000 a year; the present value of which, at 11·7 years purchase (the average value of the premiums), is £117,000, to be deducted from the aggregate value of the premiums; as, without some such expenditure, the Society cannot be sustained, the profits on the premiums cannot be realized. If the Equitable Society had securities worth £3,596,275 to meet the policies in force at the time of this valuation, no one, I conceive, could question its solvency.

"That this is the correct mode of proceeding in an investigation to determine the solvency of an Office insuring lives by invariable premiums, cannot be disputed. The charge on the net premium must be taken into account; otherwise, as Mr. Jellicoe forcibly remarks, "a Society charging very low premiums would show, *ceteris paribus*, the same assets as another charging very high ones, supposing both to value by the same table."

Here we must for the present pause, hoping shortly to resume the examination of this able and elaborate treatise.

*Return of the Sickness and Mortality in Friendly Societies.* Mr. ALEXANDER GLEN FINLAISON'S Report. Ordered by the House of Commons to be printed, 16 August, 1853.

THIS is truly a most important return, creditable alike to the enterprise of Government and to the industry and ability of its officers. It has reached our hands only just in time to enable us to bring it under the notice of our readers, and we therefore can do no more than make them acquainted with its nature and origin, reserving our comments for a future Number. Mr. Finlaison states that the facts required were those for the five years ending 31st December, 1850; and continues—

"The information requested from each Society comprised the following particulars: *In limine*, the name of the Society; the place where it was then established; and the objects of the institution. Statements were next required of—1. The initials of the member's name; 2. The member's occupation; 3. Age at the time of admission into the Society; 4. Date of admission; 5. The time (in weeks and days) of receiving relief on account of sickness; 6. Date when placed on superannuation fund; 7. Date of death; 8. Date of exclusion; 9. Date of leaving; 10. Name of disease or cause of death; 11. Place of residence at time of death; and there was added—12. A final column for remarks.

"In due course of time the data thus sought began to flow into the office of the Registrar, and the whole of the returns which were obtained were received by the close of the summer of 1851. They formed a huge mass of papers. When bound up, the collection made no less than forty large folio volumes, each some six to seven inches in thickness. Towards the close of the year 1852 the Registrar made, in accordance with the 18th section of the 13 & 14 Vict., c. 115, an abstract of such quinquennial returns, which abstract was laid before the Secretary of State for the Home Department, and also before both Houses of Parliament.

"The idea was at first entertained of placing this vast collection of information at the disposal of the Institute of Actuaries, in order that results serviceable both to science and also to the class more particularly interested in the stability and good management of Benefit Societies might be elicited by the combined judgment and experience of that learned body. Accordingly, the Council of the Institute of Actuaries was addressed by the Registrar of Friendly Societies, by a letter dated July 1852, wherein he announced his possession of forty volumes of Returns, containing accounts of the sickness and mortality experienced among the members of Friendly Societies; and their opinion was asked, 'Whether there was a necessity at that time for further data on the subjects of sickness and mortality, especially with reference to the members of Friendly Societies; and if so, whether the forty volumes of information' (of which one was forwarded as a sample) 'could be used beneficially for such an object as providing more data or not?' with the view to such opinion being laid before the Lords Commissioners of Her Majesty's Treasury. It was also inquired whether the Council would consent to superintend the preparation of such data, and the subsequent computation of tables. The general opinion of the Council on the subject, and the manner in which it would be treated, was also requested.

"In reply, the Council, 'admitting that some very valuable information had already been collected on the subject, thought that the favourable opportunity now presented of classifying the large body of more recent facts

returned to the Government order should not be lost; and taking it for granted that there existed, as represented, perfect returns of sickness and mortality experienced among 800,000 members for the last five years, the Council of the Institute would undertake the public trust of analyzing these returns, and of forming from them a set of tables of money values for rates of allowances in sickness, and for payment of given sums at death. If, however, it should hereafter appear that the use of the tables ought to be modified by the nature of the individual Society, its particular locality and special regulations, the Council would propose to append to the tables such observations as would guard the public against their indiscriminate or injudicious application.'

"The Council, therefore, while it recognized the expediency of storing and utilizing the facts recently returned to the Government, did not suggest any plan for the treatment of the information.

"The Registrar of Friendly Societies in England, in bringing under the notice of the Lords of the Treasury the fact of his being in the possession of a considerable number of returns of sickness and mortality, then proposed to their Lordships that tables should be computed from these documents under the provisions of the second section of the Act 15 & 16 Vict., cap. 65. In making this proposal for 'tabulating the returns,' the Registrar, after citing certain clauses in support of his views from the Acts 10 Geo. IV., c. 56, and 13 & 14 Vict., c. 115, adduced as a consideration, 'that such a proceeding is in conformity with the spirit of all the Acts of Parliament passed in relation to Friendly Societies; the legislature having regarded the correct calculation of tables of payments and allowances dependent on the duration of sickness and the probabilities of human life as an object which it is desirable should be attained. Also, that, however extended the information extant on general statistics may be, the true data for Friendly Societies can only be ascertained from the facts supplied by the experience of such Societies. And thirdly, that a want of more satisfactory data for the computation of the tables had been felt by the officers, members, and others interested in Friendly Societies.'

"Then, after introducing his correspondence with the Institute of Actuaries, the Registrar requested their Lordships to sanction the incurring of expenses for the computation of tables, under the second section of cap. 65 of the 15 & 16 Vict.; such computation to be carried out by the Council of the Institute of Actuaries, and upon such terms and in such manner as detailed in their letter.

"My Lords, having had under their consideration this Report and proposal of the Registrar, caused (28 October, 1852) a minute to be made of this circumstance; and after referring at the same time to the statutes in which the correct calculation of tables for the assistance of Friendly Societies is stated to be desirable, and also noticing the substance of the correspondence between the Registrar of Friendly Societies and the Council of the Institute of Actuaries, proceed to recognize the principle involved in the clauses of the Acts alluded to, and the manifest importance to the interest of Friendly Societies that every pains should be taken to place at their disposal the most ample and correct information. In this view it appeared to my Lords that they would be justified in sanctioning the expense which must necessarily be incurred in forming such tables from the returns made to the Registrar. They did not doubt that the utmost pains and care would have been taken by the Institute of Actuaries in



directing and superintending the use of the data afforded in these returns for the formation of correct tables; but it nevertheless appeared to them that in a matter of this kind it would, upon the whole, be better that the work should be undertaken by that department of the Government which is more immediately in connection with Friendly Societies, and on the establishment of which department there is employed an officer specially conversant with such matters. Before, however, giving final directions thereupon, they desired that the papers, and a copy of their minute, should be transmitted to the Commissioners for the Reduction of the National Debt, and that they might be requested to state whether they could make provision under their superintendence, and that by their officers, assisted by the Registrar of Friendly Societies, for preparing tables from the returns collected by that officer; and if so, that they would state the principles on which they would recommend such tables to be prepared, when my Lords would issue such further instructions as might appear to be necessary.

"It was then referred to the undersigned, in his capacity of Actuary to the Commissioners for the Reduction of the National Debt, to enunciate the principles upon which it should be proposed to deal with the returns. Accordingly, in a report addressed on the 30th October, 1852, to the Comptroller General of the National Debt Office, those principles which present themselves in due course throughout this paper were suggested. That report was enclosed to the Treasury, with favourable remark, in a letter of the 4th November following, in which the Commissioners expressed their readiness to give every assistance in their power in the execution of this duty.

"On the 9th November, 1852, these papers were read before their Lordships, and the Secretary of the Treasury was directed to acquaint the Commissioners for the Reduction of the National Debt, that, estimating the very great importance at the present time, in reference to the industrial classes, of well digested tables, founded upon well ascertained facts, for calculating the contingencies to which these classes are subject, it appeared to my Lords that it was advisable to carry out the intentions of the legislature in this matter in the manner suggested in the Commissioners' letter.

"Under instructions, therefore, which were issued in conformity with the objects held in view throughout the above correspondence, it immediately became my duty to carry into effect the principles which I had submitted as the proper groundwork for the proposed investigation."

Mr. Finlaison then proceeds to describe the *modus operandi* adopted by him, for which we must for the present refer our readers to the Report itself; the importance of which, and of the materials collected, it would be difficult to overrate.

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*Work recently published:—*

**Life and Marine Assurance:** Considerations which should influence Assurers in the Selection of an Office for Life Assurance, &c. By William Lance, Associate of the Institute of Actuaries, Marine Actuary. London: Longman, Brown, & Co. 1854.

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## INSTITUTE OF ACTUARIES.

THE second year's examination has passed off satisfactorily. The degree of proficiency exhibited by the candidates both of the first and second year we understand to be very creditable. There can be no doubt that the advance made in the knowledge of the subject and of all matters connected with it is already considerable, and that the actuaries of the next generation bid fair to attain, and in all probability will attain, a more independent and influential position than their predecessors. Much has to be done, and many difficulties remain to be surmounted; nevertheless, the progress made is encouraging, and is well calculated to strengthen the hope of ultimate success, and of the attainment for the profession of that character and consideration which rarely fail to accompany superior and well directed knowledge.

We publish, by permission of the Council, the questions for the second year's examination, and also the programme for the third.\* They will be useful to the candidates of the present day, and will probably at a future one be looked back to with interest, as containing the germs of a better order of things then realized.

## SECOND YEAR'S EXAMINATION, 1853,

1. Express algebraically the arithmetical properties of logarithms.
2. Show that the logarithm of  $o$  is an infinite negative quantity.
3. How is it that the characteristics of common logarithms indicate the place of the decimal point in the corresponding natural number?
4. Give the series expressing a number in terms of its logarithm and the base of the system.
5. Give the series expressing the logarithm of a number in terms of the number itself, and the base of the system.
6. The number of cases in favour of the happening of three independent events being respectively  $n'$ , out of  $n$ ;  $m'$ , out of  $m$  and  $p'$ , out of  $p$ ; required, the probability that in a given trial one event at least will happen out of the three.
7. All things being as before, required, that in the said given trial one event, and no more than one, will occur.
8. The probability of the happening of an event once in a single trial being  $n'$  out of  $n$ , state the probability of the same event happening twice, and twice only, in six consecutive trials.
9. A and B agree to play eight games at pitch and toss; what are the odds that B gains all, or all but one?
10. A bag contains six white and five black balls; what are the respective probabilities that of two drawings the results will be WB, WW, BW, BB, the first ball not being returned?
11. Determine the present value of an annuity of £1 per annum for 32 years, discounting at  $2\frac{1}{2}$  per cent. to four places of decimals.
12. Determine the amount of an annuity of £23 per annum, forborne at compound interest at 4 per cent. for 17 years.
13. Mr. Francis Baily, in page 86 of his *Treatise on Interest*, has given a formula for determining the amount of an annuity forborne for  $n$

\* This examination, we are authorized to state, will not take place till December, 1855.

years, which annuity is to commence with £1 per annum, and to increase by £1 per annum during the term; prove this to be correct or otherwise from first principles, and give the sum of the series in Mr. Bailey's notation,  $1+i=x$ .

14.  $1+i=x$  as before: find the present value of £1 per annum, increasing £1 per annum for ever.

15. Describe Mr. Bailey's method of finding the value of an annuity increasing £1 every year.

16. Find by the tables the value at 5 per cent. of an annuity for 3 years, increasing according to the order of the squares of the natural numbers.

17. Give the expression for the present value of £1 due  $n$  years hence, interest being convertible  $m$  times per annum.

18. Give the series expressing the value of  $\left(1+\frac{i}{m}\right)^{nm}$ , when  $m$  is infinite.

19. Define the difference between D'Alembert's theory, (as acted upon in the construction of Smart's and some other tables,) and the ordinary theory of compound interest.

20. By the ordinary theory, compound interest is never to be less than simple interest: show that, if  $i$  be the simple interest of £1 for a year, the compound interest for periods less than a year is less by D'Alembert's theory than the simple interest for such periods.

21. The value of an annuity at age  $x$  being  $A_x$ , and £1 increased by its interest for one year being  $1+i$ , and the numbers living in any table of mortality being respectively  $a_{x-1}$ ,  $a_x$ ,  $a_{x+1}$ , &c.; give the formula, quoted as Simpson's, but properly De Moivre's, for determining the value of  $A_{x-1}$ , and the method of constructing by such formula a table of the values of annuities,  $x$  being the oldest age in the table.

22. The notation being as in the foregoing question, show the construction of the usual columns D and N, as arranged by Davies and others.

23. Show that at any given age ( $x-2$ , for instance)  $\frac{N}{D} = A_{x-2}$ .

24. Explain briefly the methods of tabular construction pointed out by Mr. Peter Gray.

25. The value of an annuity on the life of A being  $A_x$ , and on the life of B being  $B_y$ , and on the joint lives being  $A_x B_y$ , state the value of an annuity during the life of the survivor.

26. Determine the value of an annuity deferred for  $n$  years on the longest of the two lives A and B.

27. The single premium for an assurance on the life A being added to the single premium for an assurance on the life B, and the single premium for an assurance on the joint lives of A and B being subtracted from the sum, the remainder will be the single premium on the longest of the two lives. Why will not a corresponding annual premium on the longest of the two lives result from a similar treatment of the annual premiums for the single and joint lives?

28. Notation as before, give the formula for the value of a reversion of £1 payable on the death of A, provided his life drop the first of three lives, A, B, and C.

29. Show the value of a reversion of £1 payable on the death of

A or B, if either of them should die first or second of three lives, A, B, and C.

30. Give the expression for the value of an annuity on the joint lives of C and the survivor of A and B.

#### PLAN OF THIRD YEAR'S EXAMINATION.

*As to construction of Tables of Mortality and Valuations (5 questions).*—Comparative advantages of the methods pursued by different writers.

*As to Legal Principles (5 questions).*—Deeds of settlement, Acts of Parliament, partnership *en commandite*, charters of incorporation; Joint Stock Companies, powers and duties of persons comprising them; policy considered as a contract; probates, and letters of administration; assignees and personal representatives.

*Statistical Principles (5 questions).*—Method for the arrangement and collection of data; comparative tests of accuracy; preparation of abstracts and reports.

*Political Arithmetic (5 questions).*—General system of the country's finance, funded and unfunded debt, and fiscal arrangements; taxation.

*Currency Arithmetic (5 questions).*—Currency, metallic and paper; bills of exchange; nature of banking—Bank of England, private, and Joint Stock Banks; comparative value of securities; operations of the Stock Exchange; high and low prices; rate of interest.

*Miscellaneous (5 questions).*—Office accounts, book-keeping, audit, correspondence, general routine, and approximate calculations.

*Books to be referred to.*—Milne, Gompertz, Davies, Farren, Bunyon, Dowdeswell, Smith's *Wealth of Nations*, Tooke on *Prices*, Newmarch on *Supplies of Gold and on Bills of Exchange*, McCulloch's *Dictionary*, Acts of Parliament relating to Banks and Banking, &c.

#### PROCEEDINGS OF THE INSTITUTE.

*First Ordinary Meeting, Session 1853-54.—Monday, 28th November, 1853.*

JOHN FINLAISON, Esq., President, in the Chair.

The Minutes of the last Annual General Meeting were read and confirmed.

The Secretary announced several donations to the Library.

The following Candidates, duly nominated at the last Ordinary Meeting, were elected Associates of the Institute, viz. :—

*Official Associate.*—F. A. Curtis.

*Associates.*

W. S. A. Cooper.

William Gard.

Mr. Porter read a paper "On some points connected with the Education of an Actuary."

*Second Ordinary Meeting, Session 1853-54.—Monday, 2nd January, 1854.*

E. J. FARREN, Esq., Vice President, in the Chair.

The Minutes of the last Ordinary Meeting were read and confirmed.

The Secretary read the following extract from the Council Minutes, dated 3rd of November, 1853 :—

"Read the following letter from Professor De Morgan :—

“‘7, CAMDEN STREET, CAMDEN TOWN,  
“‘October 17th, 1853.

“‘MY DEAR SIR,—Among the papers of the late Francis Baily have been found the original manuscripts of his three works on subjects connected with the business of an Actuary—namely, of the first edition of the work on Leases, of the work on Interest, and of the work on Annuities, with the Appendix.

“‘Having been consulted on the disposal of these very interesting relics, I have recommended that they should be offered to the Institute of Actuaries, on condition that if the Institute, by dissolution or otherwise, should abandon the custody of them, they shall be returned to me, if I should be then alive; and shall be presented to the library of the British Museum, if I should be then deceased.

“‘This recommendation having been acceded to, I am desired by Miss Baily, the sister of Mr. Baily, to offer the manuscripts to the acceptance of the Institute, on the condition above-named, which I have very great pleasure in doing.

“‘On being informed that this letter, together with a resolution of acceptance, is on the minutes of the Council of the Institute, I shall forthwith forward the manuscripts to the apartments of the Society.

“‘I remain, dear Sir,

“‘Yours very truly,  
(Signed) “‘A. DE MORGAN.

“‘John Finlaison, Esq.,

“‘Institute of Actuaries, St. James's Square.’

“‘Resolved—That Professor De Morgan's offer be accepted on the terms prescribed, and that the grateful thanks of the Council, on behalf of the Institute of Actuaries, be given to him for the very kind manner in which he has obtained for that body the custody of such interesting documents.

“‘Resolved—That Professor De Morgan be requested to express to Miss Baily the deep sense which the Council entertain of the favour thus conferred upon them by her, and to assure her of the watchful care that will be taken to preserve these memorials of works which, among others, have secured for their author so high a position amongst the philosophers and mathematicians of this country.

“‘Resolved—That a certified copy of the above resolutions be forwarded to Professor De Morgan.”

The following Candidates, duly nominated at the last Ordinary Meeting, were elected Members of the Institute:—

*Fellow.*—David Jones.

*Official Associate.*—Robert Christie, Jun.

*Associates.*

J. N. Harrington.  
Robert Hatton.  
George Humphreys.  
H. W. Kilburn.

Edward Nuth.  
D. R. C. Robinson.  
Charles Young.  
Samuel Younger.

The Chairman announced the result of the Annual Examinations in London and Edinburgh, by which it appeared that in London nine Candidates had presented themselves for the Second Year's Examination, and had passed in the following order of merit, viz. :—

1. J. B. Haycraft,  
2. George Scott,  
3. E. H. Galsworthy,  
4. J. P. Laurence,  
5. John Coles,

6. Charles Watkins,  
7. Charles Griffiths,  
8. Thomas Carr,  
9. Thomas Miller, Jun.;

and that out of eleven Candidates who had offered themselves for Matriculation Examination, eight had passed, their names appearing in the order of merit indicated :—

1. W. P. Pattison.
2. C. G. Fothergill.
3. Samuel Younger.
4. Robert Hatton.

5. George Humphreys.
6. J. B. Allan.
7. D. R. C. Robinson.
8. Edward Nuth.

In Edinburgh, two Candidates had presented themselves for their Second Year's Examination, and had passed, viz. :—

D. R. W. Huie,

James Wilson ;

and one for Matriculation Examination, and had also passed :

W. F. Birkmyre.

Mr. Jellicoe read a paper "On the Rates of Mortality prevailing amongst the Male and Female Lives assured in the Eagle Insurance Company during the 44 years ending 31st December, 1851."

*Third Ordinary Meeting, Session 1853-54.—Monday, 30th January, 1854.*

PETER HARDY, Esq., Vice President, in the Chair.

The Minutes of last Ordinary Meeting were read and confirmed.

The Secretary announced several donations to the Library.

The following Candidates, duly nominated at the last Ordinary Meeting, were elected Associates of the Institute :—

*Official Associate.*—W. M. James.

*Associates.*

David Hall.

T. N. Oliver.

Leone Levi.

W. H. Preston.

Henry Mortlock.

Monsieur Adolphe Quetelet was unanimously elected an Honorary Member of the Institute.

Mr. W. T. Thomson read a paper "On Decimal Coinage"; whereupon a discussion took place, in which Lord Overstone, Mr. Wood (Chairman of the Board of Inland Revenue), Dr. Gray, Mr. Hodge, Mr. Jellicoe, Mr. Farren, Mr. Hendriks, and others, took part, and which was adjourned to the next Meeting.

*Fourth Ordinary Meeting, Session 1853-54.—Monday, 27th February, 1854.*

CHARLES JELlicoe, Esq., Vice President, in the Chair.

The Minutes of the last Meeting having been read and confirmed, the Secretary announced various donations to the Library.

Mr. Frederick Hann, duly-nominated at the last Ordinary Meeting, was elected an Associate of the Institute.

The discussion on Decimal Coinage was renewed, the following gentlemen taking part in the discussion, viz. :—The Chairman, Mr. Lodge, Mr. Hill Williams, Mr. Brown, M.P. (Chairman of the Decimal Coinage Committee), Mr. Scott, Mr. Wood (Chairman of the Inland Revenue Board), and Mr. Hodge.

At the conclusion of the discussion, Mr. Hill Williams moved, and Mr. Tucker seconded, and it was unanimously resolved :—

"That this Meeting is of opinion that the plan recommended by the Decimal Coinage Committee of 1853 is the best that has been proposed, and that the Council be requested to prepare a petition to Parliament urging the adoption of that plan, with a recommendation for the issue of four-mil pieces as necessary for the protection of the interests of the poorer classes."

The thanks of the Meeting were then voted to Lord Overstone, Mr. Brown, M.P., and Mr. Wood, for the aid they had lent to the discussion, and the Meeting adjourned.

THE  
ASSURANCE MAGAZINE,  
AND  
JOURNAL  
OF THE  
INSTITUTE OF ACTUARIES.

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*On the Demonstration of Formulæ connected with Interest and Annuities.* By PROFESSOR DE MORGAN.

[Read before the Institute 26 June, 1854, and ordered by the Council to be printed.]

IN most branches of mathematics, the actual use of fundamental processes in the form which the first definitions suggest, is often supplanted, either by processes of greater skill, or by the use of pure reasoning. In the subject of which this paper treats, there has not been much attempt to connect formulæ by reasoning. The actual exhibition of successive annual results has been the only method extensively employed; and it throws the required total result into a series of terms: this series is either algebraically summed, or calculated term by term for insertion in a table.

The present paper is intended to show that this summation of algebraical series may be dispensed with, at least in questions of annuities certain: and also that common points of principle, which the ordinary methods leave altogether out of sight, will reduce many questions of life annuities to an absolute coincidence of form with the corresponding questions of ordinary annuities.

An annuity, by definition, is a succession of payments to be made at the end of periods determined by the problem. In the ordinary question, the periods of payment are those at which money returns its interest. An annuity of £1 for  $n$  payments means that £1 is to be paid by the grantor at the end of each of the first  $n$  periods at which money now put out receives interest. The periods need not be years; the first may be five minutes, the second a

revolution of Neptune, the third the duration of a life to be put in at the end of the second, and so on. It is enough that the grantee has no right to call upon the grantor until the latter has just received a term's interest upon his outstanding capital.

Using the small letters  $r$  and  $v$  when the terms are years, let  $R$  and  $V$  refer to the cases in which the term is any status whatsoever, certain or contingent; the rule being that the second status begins at the moment the first ends. Then  $1 + R$  is what  $1$  becomes at the end of the status, and  $V$  the present value of  $1$  to be received when the status ends; hence  $V = (1 + R)^{-1}$  and  $V^n$  is the present value of  $1$  to be received at the end of the  $n$ th status. A person who now gives  $1$  gives the equivalent of  $R, R, R, \&c.$  for ever, payable at the end of the first, second, &c. status; or what, in a wide sense, we must call a perpetual *annuity*,  $R, R, R, \&c.$  A person who gives  $1$  now, and revokes his gift at the end of the  $n$ th status, gives  $n$  terms of  $R, R, R, \&c.$  Let him discount his revocation—that is, let him give only  $1 - V^n$ , and he gives  $n$  terms of  $R, R, R, \&c.$  That is,  $(1 - V^n)R^{-1}$  is the present value of  $n$  terms of  $1, 1, 1, \&c.$

Let the status be a life: it may be strictly a life, or a life with a given term added, or an indefinite term, as to the end of the year of death; or any other, according as  $V$  is taken. Then  $V$  is the present value of a reversion of  $1$ , and  $(1 - V^n)R^{-1}$ , or  $(V - V^{n+1})(1 - V)^{-1}$ , is the value of all the fines, each fine being  $1$ , upon  $n$  successive lives of equal value, the first of which is just put in; and the value of the fines for ever is  $R^{-1}$  or  $V(1 - V)^{-1}$ . This formula was given by Mr. Peter Gray, in an excellent paper on successions in a former Number of this *Journal*; Mr. Milne's formula is  $V(1 - v^{t+1})^{-1}$ , where  $t$  is the number of years certain which the annuity on the life is worth. The connection involves the following theorem:—If the life be worth  $t$  years certain, the reversion of £1 is worth £1 due at the end of  $t + 1$  years; for if  $A = (1 - v^t)r^{-1}$ , it is plain that  $(1 - rA):(1 + r)$ , or  $(1 - rA)v$ , is  $v^t \times v$ , or  $v^{t+1}$ . That this should have escaped Milne, is to be attributed to the total want of reasoning on the connection of formulæ which had existed up to his time. His method is an independent one, produced by the error which had prevailed on the subject of successive lives. Mr. Ryley mentioned to me the formula  $V(1 - V)^{-1}$ , produced by him from the series  $V + V^2 + \&c.$ , and obtained by seeing that  $V, V^2, \&c.$  are the values of the successive fines, just at the time when I had put by for consideration the remark that every  $V$  must have its  $R$ , even though  $V$  stand for the value of a contingent



reversion, and that every formula of annuities certain must mean *something* in life contingencies.

If the rates of improvement vary from term to term—that is, if during the  $n$ th status 1 become  $1 + R_n$ , we may allow  $V^{(n)}$  to represent  $V_1.V_2.V_3 \dots V_n$ . All formulæ may be written as 'now, on the understanding that *powers* of  $V$  become successive products. Thus a perpetual annuity of £1 is  $V^{(1)} : (1 - V^{(1)})$ , considered as representing  $V^{(1)} + V^{(2)} + V^{(3)} + \&c.$ , or  $V_1 + V_1V_2 + V_1V_2V_3 + \dots$ . After this remark, there is no further occasion to consider unequal rates of improvement.

The present value of an annuity of £1 *per annum*, continued until the extinction of the  $n$ th life, is  $r^{-1} - (1 + r^{-1})V^n$ , or  $(1 + r^{-1})(1 - V^n) - 1$ ; since  $V^n$  is the present value of £1 deferred till the end of the year of such extinction. This may easily be verified by showing that the value of a fine of  $(1 + r)(1 + A) : (1 - rA)$  at each death is  $(1 + r^{-1})(1 - V^n)$ . The deduction is the present pound which enters the premium, but not the annuity.

When  $V$  is the value of a reversion of £1, or  $1 + R = (1 + r) : (1 - rA)$ , we find, by making  $A = (1 - v^t) : r$ , that  $1 + R = (1 + r)^{t+1}$ , as we ought to expect. The substitution of an annuity certain for a life annuity affords a means of verifying formulæ, and may lead to the habit of observing analogies.

Any number of years of the perpetual annuity  $A, B, C, D, \&c.$  is easily converted into another perpetual annuity. Thus the five years  $A, B, C, D, E$ , are equivalent to the perpetual annuity  $A - Fv^5, B - Gv^5, C - Hv^5, D - Kv^5, E - Lv^5, F - Mv^5, \&c.$ ; for the withdrawals of  $Fv^5, Gv^5, \&c.$ , are compensated by the subsequent payments of  $F, G, \&c.$ , leaving nothing uncompensated except  $A, B, C, D, E$ , at the ends of the first five years. Hence, also,  $n$  years of 1, 1, 1, &c. is a perpetual annuity of  $1 - v^n$ , or  $(1 - v^n)r^{-1}$ .

The accumulations of an annuity can also be converted into a perpetual annuity. Thus the perpetual annuity  $Av^{-3} - D, Bv^{-3} - E, Cv^{-3} - F, Dv^{-3} - G, Ev^{-3} - H, \&c.$ , is obviously only the annuity  $Av^{-3}, Bv^{-3}, Cv^{-3}$ , which is but the *terminal value* of  $A, B, C$ , or what arises from its accumulation. Thus the terminal value of  $n$  years of 1, 1, 1, &c. is a perpetual annuity of  $v^{-n} - 1$  or  $(1 + r)^n - 1$ , as commonly given. Milne has well obtained this result by observing that the compound interest of £1 in  $n$  years can only be the accumulations of  $n$  years of  $r, r, r, \&c.$

Again,  $\{(1 + R)^n - 1\} R^{-1}$ , if  $(1 + R)^{-1}$  or  $V$  be the value of an assurance of £1 on a certain life, represents the last amount assured,

as follows:—There is a fine of £1 at each of  $n$  successive deaths, and the receiver invests the first fine in an assurance on the second life, which assurance, with the second fine, he invests in an assurance on the third life, and so on.

The powers of  $r^{-1}$  represent perpetual annuities, as follows:—In  $r^{-2}$  we see the perpetual annuity  $r^{-1}$ ,  $r^{-1}$ ,  $r^{-1}$ , &c., or the annuities 0, 1, 1, 1, &c., 0, 0, 1, 1, &c., 0, 0, 0, 1, &c., or the single annuity 0, 1, 2, 3, &c.; or 1, 2, 3, &c., deferred one year. Similarly,  $r^{-3}$  is the perpetual annuity  $r^{-2}$ ,  $r^{-2}$ ,  $r^{-2}$ , &c., or the sum of 0, 0, 1, 2, 3, &c., 0, 0, 0, 1, 2, &c., 0, 0, 0, 0, 1, &c., or the annuity 0, 0, 1, 3, 6, &c.; or 1, 3, 6, &c., deferred two years. Generally,  $p_q$  standing for the number of combinations of  $p$  out of  $q$ ,  $r^{-n}$  is the value of the annuity 1,  $1_n$ ,  $2_{n+1}$ ,  $3_{n+2}$ , &c., deferred  $n-1$  years.

Hence  $\frac{(1+r)^{n-1}}{r^n}$  = present value of 1,  $1_n$ ,  $2_{n+1}$ ,  $3_{n+2}$ , &c.

Any formula which has a power of  $r$  in the denominator may be reduced by interpretation to its perpetual annuity. For example,  $r^{-2} = (v+v^2)r^{-2} + r^{-1}$ . Here we have

$$\begin{array}{rcl} r^{-3} & = & 0, \quad 0, \quad 1, \quad 3, \quad 6, \quad 10, \quad 15, \quad 21, \quad \&c. \\ r^{-1} & = & 1, \quad 1, \quad 1, \quad 1, \quad 1, \quad 1, \quad 1, \quad \&c. \\ -vr^{-2} & = & 0, \quad 0, \quad -1, \quad -2, \quad -3, \quad -4, \quad -5, \quad -6, \quad \&c. \\ -v^2r^{-2} & = & 0, \quad 0, \quad 0, \quad -1, \quad -2, \quad -3, \quad -4, \quad -5, \quad \&c. \end{array}$$

Annuity required    1,    1,    1,    1,    2,    4,    7,    11, &c.

To find the value of  $n$  years of 1, 2, 3, &c.—Make a grant of £1 now, and of an annuity 1, 1, 1, &c., of  $n-1$  years; which we may represent by  $1 \mid 1, 1, 1, \&c.$  Reclaim the  $n$  pounds at the end of  $n$  years. This amounts to granting an annuity of  $r$ ,  $2r$ ,  $3r$ , . . . .  $nr$ . The grants are worth  $1 + (1-v^{n-1})r^{-1}$ , and the revocation worth  $nv^n$ ; whence  $1 + (1-v^{n-1})r^{-1} - nv^n$  is the value of  $r$ ,  $2r$ ,  $3r$ , . . . .  $nr$ , or  $\frac{1+r}{r^2} - \frac{rv^{n-1} + nv^n}{r^2}$  = present value of 1, 2, 3, . . . .  $n$ .

This method might be carried further, as by making the grant  $1 \mid 2, 3, \dots n$ ; and so on.

Let  $P_{m-1}$  signify the sum of  $m$  terms of the development of  $(1+r)^n$ , or  $1 + 1_n r + \dots + (m-1)_n r^{m-1}$ . Consider the fractions

$$\frac{1-P_0v^n}{r}, \quad \frac{1-P_1v^n}{r^2}, \quad \frac{1-P_2v^n}{r^3}, \quad \frac{1-P_3v^n}{r^4}, \quad \&c.,$$

which call  $Q_0$ ,  $Q_1$ ,  $Q_2$ ,  $Q_3$ , &c. We have then

$$Q_1 = \frac{Q_0 - 1_n v^n}{r}, \quad Q_2 = \frac{Q_1 - 2_n v^n}{r}, \quad Q_3 = \frac{Q_2 - 3_n v^n}{r}, \quad \&c.$$

Here  $Q_0$  is  $n$  years of 1, 1, 1, &c., and  $Q_1$  is a perpetual annuity of  $Q_0 - 1_n v^n$ . For simplicity, take  $n=6$ . First,  $Q_0, Q_0, Q_0$ , &c. is 0, 1, 2, 3, 4, 5, 6, 6, 6, &c., and  $1_6 v^6, 1_6 v^6$ , &c. is 0, 0, 0, 0, 0, 0, 6, 6, 6, &c.; whence  $Q_1$  is 0, 1, 2, 3, 4, 5, or 1, 2, 3, 4, 5, deferred one year. Generally,  $Q_1$  is always  $n-1$  years of 1,  $1_2, 2_3, 3_4$ , &c., deferred one year. Again,  $2_6=15$ , and  $Q_2$  is a perpetual annuity of  $Q_1 - 15 v^6$ . But  $Q_1, Q_1, Q_1$ , &c. is the sum of the annuities 0, 0, 1, 2, 3, 4, 5 and 0, 0, 0, 1, 2, 3, 4, 5, &c., or 0, 0, 1, 3, 6, 10, 15, 15, 15, &c.; and  $15 v^6, 15 v^6$ , &c. is 0, 0, 0, 0, 0, 0, 15, 15, &c.: whence  $Q_2$  is 0, 0, 1, 3, 6, 10, or four years of 1, 3, 6, 10, deferred two years. Generally,  $P_2$  is always  $n-2$  years of 1,  $1_3, 2_4, 3_5$ , &c., deferred two years; and thus it may be shown that  $Q_m$  is the value of  $n-m$  years of 1,  $1_{m+1}, 2_{m+2}, 3_{m+3}$ , &c., deferred  $m$  years. Multiplying by  $(1+r)^m$ , we find that  $(1+r)^m r^{-(m+1)} (1 - P_m v^n)$  is the value of  $n-m$  years of 1,  $1_{m+1}, 2_{m+2}$ , &c.; or, the first  $n-m$  years of the perpetual annuity 1,  $1_{m+1}, 2_{m+2}$ , &c., are worth the fraction  $1 - P_m v^n$  of the whole.

A corresponding theorem on *terminal values*, or *accumulations*, may be independently deduced as follows:—Let

$$Q_0 = \frac{(1+r)^n - P_0}{r}, \quad Q_1 = \frac{(1+r)^n - P_1}{r^2}, \quad Q_2 = \frac{(1+r)^n - P_2}{r^3}, \quad \&c.$$

Let such a symbol as  $A, B, C | D, E, F$ , &c. denote the value of the past and future in the annuity on which  $C$  has just been paid. In  $Q_0$  we see the terminal value of  $n$  years of 1, 1, 1, &c., and

$$Q_1 = \frac{Q_0 - 1_n}{r}, \quad Q_2 = \frac{Q_1 - 2_n}{r}, \quad Q_3 = \frac{Q_2 - 3_n}{r}, \quad \&c.$$

Let  $n=6$ .  $Q_1$  is a perpetual annuity of  $Q_0 - 6$ , of which  $Q_0, Q_0$ , &c. may be resolved into 1, 1, 1, 1, 1 | 1, 1, 1, 1, 1 | 1, 1, &c., with a total of 1, 2, 3, 4, 5 | 6, 6, 6; and the withdrawal of 6, 6, 6, &c. leaves 1, 2, 3, 4, 5 |, the terminal value of five years of 1,  $1_2, 2_3, 3_4$ , &c. Again:  $Q_2$  is a perpetual annuity of  $Q_1 - 2_6$ , or  $Q_1 - 15$ , of which  $Q_1, Q_1$ , &c. is 1, 2, 3, 4 | 5 and 1, 2, 3 | 4, 5, &c., with a total of 1, 3, 6, 10 | 15, 15, &c. This the removal of 15, 15, &c. reduces to 1, 3, 6, 10 |, the terminal value of four years of 1,  $1_3, 2_4, 3_5$ , &c. Proceeding in this way, we show that  $Q_m$  or  $\{(1+r)^m - P_m\} r^{-(m+1)}$  is the terminal value of  $n-m$  years of 1,  $1_{m+1}, 2_{m+2}$ , &c.

I need not now say, that the values of successions of variable fines may be found by the same formulæ, and on the same mode of reasoning. The fact is, that a *contingency* neither does nor can

enter into any formula whatever. That which a formula calculates is a certainty; and with the act of the mind by which the certainty is accepted in lieu of a contingency, and the nature of things by which events come to justify such acceptance, algebra and its processes have nothing to do. Because the probability of an event is *three tenths*, we hold *three tenths* of the benefit which such event will bring with it if it should happen, to be the equivalent certainty. We may be right or wrong, and we know that we are right; but, right or wrong, the assignment of  $av + bv^2 + cv^3 + \&c.$  as the value of a life annuity is the assignment of the annuity certain  $a, b, c, \&c.$  as a composition for the contingency.

We are in the habit of saying that the value of an event multiplied by the chance of its happening is the *value of the chance*: it would be better, in some respects, to call this product the *equivalent certainty*. Such a phrase, had it been adopted from the beginning, would perhaps have prevented that utter separation which has taken place between the cases in which  $av + bv^2 + \&c.$  represents a life annuity, and that in which it represents an annuity certain.

Among the preceding solutions is that of a problem proposed in the last Number (p. 243). One solution was forwarded to the Editor; but it did not fulfil the required conditions. For instance, the summation of the following "series involving powers,"  $1 + r + \dots + r^{n-1}$ , was effected by multiplying it by  $1 - r$ , and thus reducing it to  $1 - r^n$ . Between this and the theorem  $(1 - r^n) : (1 - r) = 1 + r + \dots + r^{n-1}$  there is but difference of form.

*On a simple plan of Classifying the Policies of a Life Assurance Company, so as to possess, at any time, the means of forming a Table of the Mortality experienced in the Office. By SAMUEL BROWN, F.S.S., One of the Honorary Secretaries of the Institute of Actuaries, and Actuary of The Mutual Life Assurance Society.*

[Read before the Institute 27 March, 1854, and ordered by the Council to be printed.]

AFTER the valuable essays with which the members of this Institute have been favoured by our learned Vice-Presidents and other gentlemen on the subjects of our professional studies, I feel that an apology is due to you for introducing a topic of apparently so humble a character; but I have been gratified to perceive, that many of the papers read before you, and especially those above referred to, have been of such a practical character as to prove

incontestibly the utility of this Institute as the means of adding to the experience of every member, and simplifying the business details as well as the theory of life assurance.

Mr. Jellicoe's paper on the experience of the Eagle Insurance Office, which led to such an interesting discussion at a previous Sessional Meeting, recalled to my mind the toilsome labours in which for more than a twelvemonth, when in the Equitable, I was engaged, under Mr. Morgan, in bringing together the materials for the Equitable experience, printed in 1834, and in forming tables deduced therefrom. The number of books, which had to be consulted for a period of seventy years, to ascertain the exact date and mode in which the members (many having several policies effected on their lives) ceased to be connected with the Society, can only be conceived by those who have had to gather the same materials from books not arranged to convey the information sought for. The dust of oblivion had to be brushed away from the name of many a totally forgotten member, that he might form a useful particle in a new collection of facts, intended to instruct and benefit a new generation.

Mr. Arthur Morgan, in the introduction to his *Tables*, remarks—"From the time when the Equitable Society was first established until within the last few years, it certainly was never contemplated by those who were engaged or consulted in conducting its affairs, that the probabilities of life amongst its members would afford sufficient data for constructing tables of the expectations of the duration of human life, or of the values of life annuities, which might be safely available for any practical purposes; nor were the accounts arranged with a view to the exhibition of a distinct statement of the duration of the lives assured at each particular age, as displayed in the following tables, although an annual comparison of the probabilities of life in the Society with those in the Northampton Tables has been regularly made, in conformity with a plan suggested by Dr. Price to the court of directors in the year 1776." No doubt the same trouble and difficulty have been experienced by the managers of the other Assurance Companies, who have with so laudable a liberality contributed to our knowledge on the same important subject.

Mr. Galloway, also, in his introduction to the *Tables of Mortality, deduced from the Experience of the Amicable Society*, observes—"In collecting the materials for these tables, great pains were taken to insure the most scrupulous accuracy. In the early part of the period over which the observation extends, the Office

registers were not arranged with a view to the present investigation ; and as a large proportion of members were assured in more than one policy, while the record of the second assurance did not always contain a reference to the first, much difficulty was experienced in ascertaining the exact number of persons who had stood the chances of life in the Society. After repeated comparisons of different sets of books, and reference to the money accounts in all cases of discrepancy, a list, correct (I believe) in every respect, was at length prepared, containing the following particulars:—1, The name of each individual on whose life an assurance was effected for the first time ; 2, his office age at admission ; 3, the date of his admission ; 4, the date of his death or discontinuance, if not living in the Society on the 5th day of April, 1841 : which are all the data required for the construction of the tables. The ages at admission were certified by abstracts from baptismal registers, or by affidavits, and the dates were carefully checked."

I happen to be in possession of an older and very elaborate table, prepared by Mr. Pensam, the former registrar, showing the mortality of the Amicable Society from 1731 to 1831, with the number of assurances, and the deaths, and a comparison with the Northampton Table at every age of entry and for every year after admission ; together with the separate experience from 1807 to 1831, prepared in the same manner. I possess also the Total Experience Tables, showing the law of mortality in the same Society during the century preceding 5th April, 1831, with various arithmetical tables deduced therefrom, prepared by Mr. Finlaison. But both these tables appear to have been superseded, and the trouble taken in forming them rendered useless, by the more accurate and laborious inquiries of Mr. Galloway. I merely mention these facts to show the great saving of time, labour, and expense, which will result by the simple arrangement for collecting these facts from the beginning of a Society, which I shall have to propose.

Further : it may be gathered, from the introduction to the *Tables exhibiting the Law of Mortality deduced from the combined Experience of Seventeen Life Assurance Offices*, printed in 1843, that not only was the task to each contributing Company one of great labour and difficulty, but that the method of registering entries and ages was so different, that some of the returns, after the time and toil expended, were quite useless for the purpose required, notwithstanding the willingness of the managers to communicate their experience and the value of the information asked for. The former we may gather from the length of time the investigation

occupied; for the circular with the forms was dated as sent out on the 25th Sept., 1838, and the Committee remark, "that the whole of the returns were not received from the contributing Offices until after the middle of the year 1841, and that the diversified classification of the assurances has added much to the complexity of the operations." In another part they state that "it was found impracticable to combine the facts contained in the whole of the returns, so as to show the exact number that died, and were discontinued, and existing at each age, as some of the returns were made up giving the current age, and others the completed age, at entering; and the number existing in some returns had been exposed to the risk of mortality for a whole year, and in others to no part of it."

I need not spend much time in impressing upon you, gentlemen, the value of the information thus sought to be obtained; it will be evident to every member of this Institute. We must all feel, too, the credit which is due to the compilers of each of the elaborate collection of tables I have enumerated, for the zeal and liberality of mind which have led them to suggest and prosecute such toilsome investigations, and to procure their publication for the benefit of all our profession. As one who has profited by their scientific labours, I gratefully record my own sense of the honour which is due to them; and I would venture respectfully to urge upon every member of the Institute, that an example so honourable ought to be followed by everyone, who, in his sphere, can add something to our own experience—something which may tend to the eventual benefit of his country. It is by this public spirit that we shall not only give to our profession that position, both before the Government and the public, which everyone who has chosen it ought to seek to achieve for it, but we shall prove also, that those who love science for its own sake cease to be actuated by merely selfish motives, and set before themselves a more noble and intellectual distinction as the aim and object for which they toil.

The inquiries here suggested are peculiarly suited for the members of this Institute. There must always be a difficulty in bringing together for a special occasion a number of individuals to work harmoniously for a common object. This spirit, at least, we profess to have already acquired; and the frequent and interesting discussions which we have together will teach us how best to employ it. Since the publication of the tables described, an immense and valuable collection of facts has been accumulating in the records of the different Offices, from which many important

results might be deduced, and the law of mortality in various classes of the community probably obtained. I have drawn attention to the difficulty of collecting the facts already published, because it is easy to foresee that the same excuses which were made before will probably be made against furnishing similar information hereafter; yet I venture to affirm that its publication will be much more needed, from the changes in progress in the working of our business, the new combinations to which life assurance is applied, and the entirely new classes of society who come within the sphere of its operations. The immense advantages which would be derived from a combination of the materials accumulating, have induced me to point out what appears to me a very simple plan of classifying the policies of a Life Assurance Company from its commencement, so that all the important facts, by one entry, will be preserved in a form for future reference, and even for being united with those of any other Company, with nothing more than a mere summary of results, which can be made at any time when it is required. It is very important to notice, that some of the columns are almost absolutely necessary if a valuation of the liabilities is to be made frequently, and that the plan proposed will enable it to be performed from year to year with the mere labour of calculating the values of the total sum assured and premiums in force at each age.

I here present the form of the book; and after describing the use of the columns, I will conclude by pointing out the facilities and advantages which it offers.

### FORM OF CLASSIFICATION BOOK.

#### *Left-hand Page.*

Age.*	(1) Date of Admission.	(2) How cancelled.	(3) Duration of Policy.	(4) Policy No.	(5) Sum.	(6) Premium.	(7) Sex. (F.)	(8) Occupation.	(9) Remarks.

#### *Right-hand Page.*

(1) Date of cancellation.	(2) How cancelled.	(3) Policy No.	(4) Sum assured. †	(5) Premium.	(6) Cause of Death.	(7) Remarks.

\* Date of birth may be here inserted in another column, if necessary.



Col. 1, in the left-hand page, is the date of entry into the Society, which should comprise both the day and month. Col. 2 is the initial of the letter how cancelled—(C), claim; (S), surrendered; (F), forfeited; (E), expired. The last three initials are comprised under the head of "discontinued" in the tables to which we have before referred, but they should be distinguished against each policy. Col. 3, the important entry of the actual duration of the risk, which should be in years and decimals of a year from the actual day of admission. Col. 4 contains the policy number; 5, the sum assured; 6, the premium; 7, the sex, marked by a single letter, only when the assurance is on a female life; 8, the occupation; and a column (9) is left blank for remarks. In this may be noted, if required, the period during the existence of the policy for which the life assured has been exposed to the risk of foreign residence, or any other unusual risk, and when it commenced and terminated.

On the opposite page we have Col. 1, the date when the policy was cancelled. Both the day and the month should be given. In case of death, the entry in this column should be the day of death as proved by the certificate; in case of surrender, the day on which the value was paid; in all cases, indeed, the day on which the risk to the Society actually terminated. Col. 2 contains the mode in which it was cancelled, marked by an initial as before; Col. 3, the policy number; Col. 4, the sum assured; Col. 5, the premium paid; Col. 6, the disease of which the party died, in case the policy became a claim; and a column (7) is left for remarks.

For the sake of simplicity, let us assume that the book is about to be commenced at the end of the first year of the Society's operations. The different pages are headed with the different ages of life, allowing in consecutive pages for as many entries as are likely to be made at each age of admission, increasing by one year for as many years as the book is intended to last. Each policy is to be entered in the order of its number on a separate line, with the details required under the different columns. The age to be taken is the Office age, and which, as the parties may in most Companies be supposed to enter one with another at half a year short of this age, and quit the Society one with another half a year short of their next Office age, when they leave, will allow the comparisons of living and dying to be made at very nearly the true numeral ages of life. On the other side of the account, we write off under the proper heading the items of policies cancelled before the end of the first year. Deducting this side from the other, we leave what may

be called the balance of the numbers, sums, and premiums on the total policies in force at each age: in other words, we have all the materials ready for the valuation of the Society's liabilities at the end of the first year. The sum of these should be carefully checked by the sum of the entries into the policy ledger, with the cancelled policies first deducted, so that no error will escape detection, except the chance of the entries being made under wrong ages. Proper care should be taken to ensure accuracy in this respect, but the errors in the valuation (if any) arising from this source will be very trifling, as they would probably only consist of the difference between the value of a policy at one age and the next. I look upon this practical use of the book, in the form I suggest, as very important, since every actuary will feel the satisfaction of knowing approximately from year to year the actual working of the Society and the growth of its profits, even though no use should be made of the information till the period of division. If it should be necessary even to value every policy separately, as in some of the Offices is still the practice, it is nevertheless very convenient to be able to check the results by a method which, in a valuation of several millions, would not give a difference of more than a few hundreds of pounds.

At the end of the next year we begin by entering on the right-hand side the cancelled policies in the same form as in the preceding year, at an Office age one year older than before, as on the other side all which stand as existing policies before they are dealt with in this way are one year older than they stood at the preceding date. Part of policies surrendered, and any cancellation of premiums only, by commutation or otherwise, must be brought into the proper column without touching the numbers of the policies. Having deducted from the left-hand side the total of the numbers, sums, and premiums written off, it only remains for us to enter beneath each policy which has been effected at the Office age at which the remainder now stand, with any increase in the sums or premiums of the old policies, and we have again ready for valuation at the end of the second year all the policies in the Society existing at an age one year older than in the entries of the preceding year. I need not pursue this process further. It is evident that, however long the Society may have been in existence, the last result of the continuation of this page, so obtained, will be the amount for valuation under the age last arrived at. Thus, to assume the existing age of 50, in 20 years from the commencement of the Office, it will be the remainder of the policies which have been admitted respectively in each Office year at 30, 31,

32, &c., down to 50 years of age, and which are then existing at the last-mentioned age. No mistake can occur in cancelling under the wrong age, because the very policy which has been entered on the left hand will, with the identical sum and premium, and any changes effected in them, have to come off on the right-hand page. A moment's inspection will show where the difference, if any, arises. If any excess of premium is taken for any unusual risk, the ordinary premium should be charged in the premium column, and the excess in another column by the side; as this will afford the means, when comparing the mortality, of seeing whether the increase of premium is of an equal per centage with the increase of mortality in these classes. It may be proper to mention, that a column may be provided for the reversionary bonus, where this is ascertained at long intervals; and another for the reduction of premium, if the bonus be taken in this way. But I prefer keeping these particulars in a book, of a similar form as to the ages, but which, being without any other column than the number of the policy, will allow both these particulars to be entered, compared, and valued for several years successively.

I will now notice in a few words the facility that a book in the form suggested affords for composing a table of mortality at any given time. For this purpose, the columns actually required are the date of admission, the mode of cancelment, and the duration of the policy. Assuming, as in the previous example, that if all the policies in that page or continuous pages of entry were in force, they would represent members of 50 years of age, we have only to enter, on a sheet of paper properly ruled, the number existing, discontinued, and died at each successive age, by counting the number existing at the date of observation, the number which were written off under either head having more than 19 years' and less than 20 years' duration, the number having more than 18 and less than 19 years' duration, and so on to less than one year duration, and arrange under each other such as entered at the same ages in the different years since the establishment of the Office. In order to distinguish policies from lives, we may enter the name or occupation of the party under the first policy he effects; and on the lines headed "occupation" in which his subsequent policies appear, refer by number to each of the policies existing on his life. In all calculations relating only to lives, only those policies in which the name or occupation is entered need count, taking care that the duration of membership is marked in lieu of the duration of the first policy only.

If it be desired to separate the investigation into the mortality amongst "male or female lives," or according to "occupation," or the actual experience of an Office as to its "policies," as distinguished from "lives assured," *age* will still be the element of all the inquiries; and the only deviation necessary from the former process will be to carry out the facts, which we have considered as general, into separate tables. The sum of their results should be identical in number of facts with those which would be obtained in the manner I propose under the head of "lives" or "policies."

I need scarcely allude to the many advantages which would result from the general adoption by every Office of a book in this form. The labour of one clerk for a few days would enable the entries to be kept up from year to year with perfect correctness; and should the Offices agree at any time to unite their experience, and ascertain in what respect different classes of assured lives vary in mortality from the average of the country at large, there would be no need of an elaborate research into old books framed for a totally different purpose. A simple summation of results and transmission of them to this Institute, or a Central Committee of Actuaries, would, without communicating to strangers the internal condition or management of a Company, allow the reasonings of mathematical men to be brought to bear on results, without the labour and waste of time in collecting them, and science and business might unite in a common purpose for the public good.

Considering that the engagements of Life Assurance Companies are variously computed at from £150 to £200,000,000, we can hardly overrate the importance of knowing the laws of mortality and disease on which our calculations depend. The valuable and elaborate essays of Dr. Farr, in the Registrar General's Reports, should act as a stimulus to every member of our profession to throw such light as his experience will enable him on the great questions which Dr. Farr has so ably discussed. We not only are deeply interested in knowing in what respects the mortality amongst assured lives corresponds with or differs from that of the public at large; but also, whether it may not from time to time undergo changes from new methods of carrying on business, or new classes who may be brought in to partake of the benefits of life assurance.

I will now conclude with suggesting that every Company should at once commence from this time a record somewhat in the form proposed. The past may be made up, as opportunities

of leisure occur. I have acted under the impression of the future value of such a work in my own Office, and have just completed the classification of the policies from the beginning; and it is satisfactory to state, that the results, after additions and deductions for 20 years, exactly agree with the particulars of the policies in force, though in the course of that time many minute alterations of premiums, ages, &c., must have occurred. Those who feel the value of time will not despise even slight suggestions, such as I have ventured to lay before you. If they help to remove the serious difficulty to combining the experience of several Assurance Companies—viz., the labour and time which cannot be spared for bringing the first materials together—they will, I am convinced, lead to results hereafter which not only the actuary but the public will benefit by. Simplicity is often the effect of experience; and whilst other animals may by instinct work to perfection, man must improve by the communicated knowledge of another, and profit even by his mistakes and failures. It is this feeling which has induced me to bring before you a plan which I have found by experience to be useful, which is simple in arrangement, capable of being used for other official purposes, and which, with very little addition to present labour, may afford the means hereafter of making new discoveries in the science of probability and the statistics of life.

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*On the Method of Approximating to the Values of Deferred and other Life Annuities, when payable Half Yearly and Quarterly.*  
By HOLMES IVORY, one of the Vice-Presidents of the Institute of Actuaries.

[Read before the Institute 24 April, 1854, and ordered by the Council to be printed.]

THE difference between the value of an immediate life annuity when payable yearly, and that of the same annuity when payable half yearly or quarterly, has, as is well known, been variously estimated by our leading authorities.

According to Dr. Price and Mr. Morgan, "a fifth of a year's purchase will be generally more than a sufficient addition if the value of the annuity is desired payable half yearly, and three tenths of a year's purchase if the value of the annuity is desired

payable quarterly." \* Mr. Baily, again, following Simpson, lays it down as a rule "that the value of annuities payable *yearly* must be increased nearly one fourth of a year's purchase in order to show the value of the same annuities payable *half yearly*, and that they must be increased nearly three eighths of a year's purchase in order to show the value of the same annuities payable *quarterly*." The same rule is also given by Mr. Milne.†

The algebraical investigations from which the above rules were deduced are fully detailed by the authors referred to; and the difference between the results arrived at is sufficiently explained by the fact, that Dr. Price has proceeded on the assumption of interest being received and accumulated half yearly and quarterly at the same periods of the year at which the annuities are payable, and at rates equal to *one half* and *one fourth* respectively of the nominal annual rate, whereas Simpson and Baily take the interest for portions of a year at such a rate as will produce the nominal annual rate and no more at the end of the year. Which of the two rules ought to be preferred may perhaps admit of some difference of opinion; for though that given by Baily is now almost universally adopted, the views of Dr. Price as to what is implied in speaking of a certain rate of interest payable half yearly or quarterly seem most in accordance with general use and understanding. In evidence of this it may be sufficient to refer to the fact, that dividends or interest on Government and Bank Stocks, though spoken of as yielding 3, 5, 10, or other per cent. premium, are all payable half yearly, at rates just equal to half the annual interest.

But without dwelling farther on this point, it is proposed in what follows to adopt Mr. Baily's rule as the basis of calculation. It is at the same time of importance to remark, that whichever rule may be adopted, the specific addition thereby required, in respect of the half yearly and quarterly payments of the annuity, remains the same, whatever the rate of interest, the age of the party, or the number of lives concerned, provided only that the annuities are immediate and to continue to the close of life. The closeness of the approximation thus obtained, and the slight effect which the age of the annuitant has on the result, will be at once appreciated when it is stated that, while the approximate value of an annuity payable half yearly, to a person aged 15, amounts by Mr. Baily's rule to (interest 3 per cent.) £22·8320, the exact value by calculation on the footing of interest being received half yearly, at a rate

\* Price, vol. i. p. 246, 6th and 7th Editions.

† Baily, ch. x. § 355. Milne, ch. viii. § 485.

to produce 3 per cent. per annum, is £22·8296, being a difference of only £·0024;\* and that at age 85 the approximate value of an annuity payable half yearly is, according to Mr. Baily's rule, £3·2830, the exact calculated value on the footing of interest payable half yearly, at 3 per cent. per annum, being £3·2795, showing a difference of £·0035.

When the annuities are not immediate, but temporary, deferred, or contingent, the rule must be modified to suit the special circumstances of each case; and the object of the present communication is to endeavour to determine the nature and extent of the requisite modifications.

Mr. Sang, it is believed, is the only authority who has especially adverted to this particular point; and the rules given by him in the Introduction to his *Tables* have reference only to deferred and temporary annuities on single lives, and require to be adjusted to suit the ordinary form of annuity tables.† The whole question, indeed, is not in itself of much commercial importance; still, as accuracy is at all times desirable, and as questions do occasionally occur in which the effect of half yearly and quarterly payments have to be considered and allowed for, it is hoped that the following suggestions may not be without some interest to the practical as well as to the theoretical actuary.

## I. DEFERRED ANNUITIES.

The value of a yearly annuity, deferred  $n$  years on a life now aged  $m$  years, is found by calculating the value at age  $m$  of the sum which at age  $m+n$  will purchase an annuity to a life aged

\* The formula for finding the value of an annuity,  $a$ , payable half yearly, as deduced by Mr. Baily (ch. x. § 352), is

$$\frac{2(1+\rho)^{\frac{1}{2}}+2+\rho}{4(1+\rho)^{\frac{1}{2}}} + a \times \frac{1}{4(1+\rho)^{\frac{1}{2}}};$$

which expression, since the quantity  $\frac{2(1+\rho)^{\frac{1}{2}}+2+\rho}{4(1+\rho)^{\frac{1}{2}}}$  seldom much exceeds unity, may

be taken without material error as equal to  $a + \frac{1}{4(1+\rho)^{\frac{1}{2}}}$ ; and  $\frac{1}{4(1+\rho)^{\frac{1}{2}}}$  being seldom much below  $\frac{1}{4}$ , the expression may be still farther reduced to  $a + \frac{1}{4}$ ; and hence the rule given by Mr. Baily. When interest is at 3 per cent., the quantity  $\frac{2(1+\rho)^{\frac{1}{2}}+2+\rho}{4(1+\rho)^{\frac{1}{2}}}$  is equal to 1·000054, and the quantity  $\frac{1}{4(1+\rho)^{\frac{1}{2}}}$  is equal to ·2463323, or ·0036677 less than  $\frac{1}{4}$ .

† Mr. Sang has framed his *Tables* on the assumption of the annuity being payable in advance or at the beginning of the year. The tables usually made use of, however, assume that the annuity is payable at the end of the year. Hence the value of an immediate annuity, as given by Mr. Sang, is always greater by 1 than that given in the ordinary tables.

$m+n$ ; \* the formula according to the usual notation being

$$a_{m/n} = \frac{l_{m+n}v^n}{l_m} \times a_{m+n}$$

To find the value of the same annuity payable *half yearly*, it is obvious that the approximate addition of £25, or one fourth of a year's purchase, in respect of the half yearly payments, must be made to the value of the annuity at an advanced age, or to  $a_{m+n}$ , and the present value of the sum thus obtained found as at the age  $m$ . Hence the following formula:—

$$a_{m/n} = \frac{l_{m+n}v^n}{l_m} \times (a_{m+n} + \cdot 25) = a_{m+n} \times \frac{l_{m+n}v^n}{l_m} + \cdot 25 \frac{l_{m+n}v^n}{l_m};$$

or, by the D and N columns,

$$\frac{4N_{m+n} + D_{m+n}}{4D_m}.$$

In like manner, the value of the same annuity, payable *quarterly*, will be obtained by the following formula:—

$$(a_{m+n} + \cdot 375) \times \frac{l_{m+n}v^n}{l_m} = a_{m+n} \times \frac{l_{m+n}v^n}{l_m} + \cdot 375 \frac{l_{m+n}v^n}{l_m};$$

or, by the D and N columns,

$$\frac{8N_{m+n} + 3D_{m+n}}{8D_m}.$$

Expressed in words, the rule may be stated shortly as follows:—

1. *For an annuity payable half yearly.*—To the value of a deferred annuity payable yearly, add the present value of a quarter of a year's purchase of the annuity payable at the end of the deferred period.

2. *For an annuity payable quarterly.*—To the value of a deferred annuity payable annually, add the present value of three eighths of a year's purchase of the annuity payable at the end of the deferred period.

The same results will be obtained according to Mr. Sang's method, when modified to suit the ordinary form of annuity tables. Thus  $a_{m/n}$  being the value of a yearly annuity of £1 deferred  $n$  years, and  $a_{m/n-1}$  the value of the same annuity deferred for  $n-1$

years, it may be assumed that  $\frac{a_{m/n} + a_{m/n-1}}{2}$  will represent very

\* In conformity with general practice, an annuity deferred  $n$  years is here held to mean an annuity to be entered on at the end of  $n$  years, and of which the first payment is to be made at the age  $m+n+1$ . This mode of distinguishing the period of entering on an annuity from that on which the payment is to commence is apt to lead to mistakes; and it might be well, therefore, were the suggestion made by Mr. Farr in his *Treatise on the Finance of Life Assurance* (p. 30), appended to the octavo edition of the *Twelfth Annual Report of the Registrar General*, to be generally adopted, and an annuity deferred  $n$  years held to be one of which the first payment is to be made at the age  $m+n$ .



nearly the value of an annuity of £1 deferred  $n - \frac{1}{2}$  years, or one of which the first payment is to be made at the end of the first half year after the expiry of  $n$  years; and consequently, that  $\frac{a_{m/n} + a_{m/n-1}}{4}$  will represent the value of an annuity of 10s. per

annum, of which the first payment is to be made six months after the expiry of  $n$  years. But  $\frac{a_{m/n}}{2}$  being the value of an annuity of

10s., of which the first payment is to be made at the end of a year after the expiry of  $n$  years, it follows that the sum of these two expressions will give very nearly the value of an annuity of £1 payable by half yearly instalments of 10s. each; and accordingly,

$$\frac{a_{m/n}}{2} + \frac{a_{m/n} + a_{m/n-1}}{4} = \frac{3a_{m/n} + a_{m/n-1}}{4}$$

will be the value of a deferred annuity  $a_{m/n}$  payable half yearly.

When the annuity is payable quarterly, the value will in like manner be found as follows:—As  $\frac{a_{m/n} + a_{m/n-1}}{2}$  gives, as above shown, the value very nearly of an annuity of £1 of which the first payment is to be made six months after the expiry of  $n$  years, so

$$\frac{a_{m/n-1} + \frac{a_{m/n} + a_{m/n-1}}{2}}{2} \text{ will be the value of an annuity of } \text{£1 of}$$

which the first payment is to be made at the end of three months, or one fourth of a year after the expiry of  $n$  years; and

$$\frac{a_{m/n} + \frac{a_{m/n} + a_{m/n-1}}{2}}{2} \text{ will be the value of an annuity of } \text{£1 of which}$$

the first payment is to be made at the end of three quarters of a year after the expiry of  $n$  years. But  $a_{m/n}$  being the value of an annuity of which the first payment is to be made at the end of one year after the expiry of  $n$  years, it follows that the sum of these four expressions will give the value of four several annuities of £1 each of which the first payments are to be made at the end respectively of one quarter, one half, three quarters, and one whole year after expiry of  $n$  years, and will be expressed by

$$\frac{10a_{m/n} + 6a_{m/n-1}}{4} = \frac{5a_{m/n} + 3a_{m/n-1}}{2};$$

and hence, dividing by 4, we get the value of an annuity of £1 payable quarterly, or  $\frac{5a_m/n + 3a_m/n-1}{8}$

The following examples in numbers will show the practical working of the rules, and the accordance of the results according to both methods :—

(1.) Required the value of an annuity of £1 deferred 22 years, and payable half yearly to a person now aged 35.

<i>First Method.</i>		£
Value of an annuity deferred 22 years on a life of 35, and } payable <i>yearly</i>		4.43587
Add value of £.25 payable to a life now 35, at end of 22 years		.09548
		<hr/>
Value of deferred annuity payable half yearly		£4.53135

<i>Second Method.</i>		£
Value of an annuity deferred 22 years on a life now 35, } payable <i>yearly</i>		4.43587
		3
		<hr/>
		13.30761
Value of ditto, deferred 21 years		4.81780
		<hr/>
		4 ) 18.12541
		<hr/>
Value of deferred annuity payable half yearly		£4.53135

(2.) Required the value of the same annuity payable quarterly.

<i>First Method.</i>		£
Value of deferred annuity on life 35, as above		4.43587
Value of three eighths, or £.375, payable at end of 22 years		.14322
		<hr/>
Value of deferred annuity payable quarterly		£4.57909

<i>Second Method.</i>		£
Value of annuity payable yearly, as above		4.43587
		5
		<hr/>
		22.17935
Ditto of ditto, deferred 21 years, £4.81780 × 3		14.45340
		<hr/>
		8 ) 36.63275
		<hr/>
Value of deferred annuity payable quarterly		£4.57909

## II. TEMPORARY ANNUITIES.

The value of a temporary annuity payable annually being equal to the present value of an immediate annuity on the whole life, less

the present value of an annuity deferred for the period the temporary annuity is to continue, it follows, from what has been already shown, that the value of the same annuity payable half yearly will be found by the following formula:—

$$(a_m + \cdot 25) - \left( \frac{l_{m+n}v^n}{l_m} \times a_{m+n} + \cdot 25 \right) = a_m - a_{m/n} + \cdot 25 \times \left( 1 - \frac{l_{m+n}v^n}{l_m} \right) \\ = a_{m/n} + \cdot 25 \times \left( 1 - \frac{l_{m+n}v^n}{l_m} \right).$$

For the same annuity payable quarterly the formula will be

$$a_{m/n} + \cdot 375 \times \left( 1 - \frac{l_{m+n}v^n}{l_m} \right).$$

Hence the following rule:—To the value of a temporary annuity payable annually, add one fourth or three eighths of a year's purchase, according as the value is wanted payable half yearly or quarterly, less the value of the same sum payable at the end of the period for which the temporary annuity is to continue.

According to Mr. Sang's method, the value will be found as follows:—

$a_{m/n}$  being the value of a yearly annuity for  $n$  years on a life aged  $m$ , and payable at the end of the year,  $a_{m-n-1} + 1$  will represent the value of an annuity on same life for  $n$  years payable at the beginning of the year, and  $\frac{a_{m/n} + a_{m-n-1} + 1}{2}$  will be the value very nearly of an annuity of £1 of which the first payment is to be made six months hence; consequently,  $\frac{a_{m/n} + a_{m-n-1} + 1}{4}$  will give the value of an annuity of 10s. of which the first payment is to be made six months hence. But  $\frac{a_{m/n}}{2}$  being the value of a temporary annuity of 10s. per annum of which the first payment is to be made at the end of a year, it follows that

$$\frac{a_{m/n}}{2} + \frac{a_{m/n} + a_{m-n-1} + 1}{4} = \frac{3a_{m/n} + a_{m-n-1} + 1}{4}$$

will represent very nearly the value of a temporary annuity of £1 payable *half yearly*.

In like manner, the value of a temporary annuity payable *quarterly* will be found to be

$$\frac{5a_{m/n} + 3(a_{m-n-1} + 1)}{8}.$$

The following example shows the accordance of the results obtained by the two methods.

(1.) According to the *first method*, the value of a temporary annuity of £1 for 22 years payable half yearly to a person now aged 35, is found as follows :—

Value of temporary annuity of £1 for 22 years on life 35, } payable yearly . . . . .	£13·9978
Add for half yearly payments . . . . .	£·2500
Less present value of £·25, payable at end of 22 years	·0955
	<hr/>
	·1545
Value of temporary annuity payable half yearly .	£14·1523
	<hr/>

(2.) Taking the second method, the calculation will stand thus :—

Value of temporary annuity for 22 years on life 35, payable yearly	£13·9978
	3
	<hr/>
	41·9934
Do. of temporary annuity for 21 years, payable yearly (£13·615) + 1	14·6159
	4 ) 56·6093
Value of temporary annuity payable half yearly, as above	<hr/>
	£14·1523
	<hr/>

### III. REVERSIONARY ANNUITIES.

Since the present value of a reversionary annuity is evidently the same as the present value of the sum which would be sufficient to provide for such annuity at the close of the year in which the life on whose failure the opening of the reversion depends may drop—and seeing further that the first payment of the reversionary annuity falls, from the nature of the case, to be made at the same period—it follows that the annuity must be dealt with as one payable in advance; and consequently, to convert the present value of a reversionary annuity payable yearly into that of one payable half yearly, we must, in respect that only one half in place of a whole year's annuity will be paid in advance, deduct in the first place, from the value of the annuity when payable yearly, the present value of £·5 or half a year's purchase payable as at the close of the year in which the life may drop, and then add the present value of the usual addition of £·25 or one fourth of a year's purchase, payable as at same period, in respect of the half yearly payments: or, which is the same thing, we must deduct from the present value of the reversionary annuity payable yearly the value of one

fourth of a year's purchase payable as at the end of the year in which the life may fail; and, adopting Mr. Jones' notation, the formula will be

$$a_m - a_{m_1} - \frac{A_{m(i)m_1}}{4}$$

where  $a_m$  represents the surviving life, and  $A_{m(i)m_1}$  the value of £1 to be received at the end of the year in which the life aged  $m$  may fail, provided that life be survived by another aged  $m_1$ .

For example: the value of a reversionary annuity of £1, payable *half yearly* to a person now aged 34, after the death of another now aged 45, will be found as follows:—\*

The value of the reversionary annuity payable annually being	} £5.266
£18.675—£13.409 (Jones' Carlisle Table)	
Deduct the value of £.25 (£.5—£.25) payable to 34 after death	} .092
of 45 (Gray's Tables)	
Value of reversionary annuity payable half yearly	<u>£5.174</u>

The value of a reversionary annuity payable *quarterly* is found on the same principle, by deducting from the value payable yearly the present value of £.75 less £.375 (= £.375), payable at the end of the year in which the life may drop,=

$$a_m - a_{m_1} - .375 \times A_{m(i)m_1}$$

#### IV. SURVIVORSHIP ANNUITIES.

These will be dealt with in a similar manner; and their value, when payable half yearly, will be found by adding to the value when payable yearly the present value of £.5—£.25 (= £.25) payable at death of either, the formula being

$$a_m + a_{m_1} - 2a_{m.m_1} + \frac{A_{(m_1)m_1}}{4}$$

\* The *rationals* of the operation will perhaps be better exhibited in the following form:—

The present value of a reversionary annuity on a life 34 after one of 45 being £5.266, is equivalent to a *sum* payable at the end of the year in which 45 dies (leaving 34 alive) of £14.310, which represents the value as at that date of an annuity of £1 payable annually during the remainder of the life of a person now aged 34, after the death of another aged 45, and of which the first payment has to be made in advance or at the end of the year in which 45 dies. But as the annuity is to be paid by half yearly instalments, the first payment will only be £.5 in place of £1, and we must therefore deduct £.500; on the other hand, there has to be added in respect of the half yearly payment £.250, leaving to be deducted £.250; and the value of an annuity of £1 payable half yearly to a life now aged 34, ascertained as at the end of the year in which 45 dies, is £14.060, the present value of which at age 34 is £5.174, agreeing with the result in the text.

### 300 *On the First Parliamentary Committee of Insurance, &c.*

For example: the value of an annuity of £1 payable to the survivor of 34 and 45 will be

$$18\cdot675 + 15\cdot863 - (2 \times 13\cdot409) \quad \text{£} \quad 7\cdot720$$

$$\text{Plus the value of £0}\cdot25 \text{ payable at death of either } \frac{A(34\cdot45)}{4} \quad \cdot145$$

$$\text{Value of survivorship annuity payable half yearly} \quad \underline{\underline{\text{£7}\cdot865}}$$

The above cases comprise most of those usually met with in practice; and as the same principles will regulate the calculation in the other and less common forms of life annuities, it seems unnecessary to add to the length of the present communication by going into farther details in regard to them.

I. *On the First Parliamentary Committee on Insurance; with Remarks illustrative of other facts connected with the History of Insurance.*

II. *A Review of some Recommendations of the Select Committee of the House of Commons on Assurance Associations, 1853.*

By FREDERICK HENDRIKS, *Actuary to the Globe Insurance Company.*

[I., concluded from page 131; II., *vide* page 324, *post.*]

THE preceding were the last two petitions which had to be reported on. The petitioners for the Forfeited Estates project were advised, but not at the right time, that their existing Act gave them the powers they were petitioning for. Upon this advice they offered to waive further proceedings; but this was disallowed, as the Attorney General elicited, in his examination of Case Billingsley, that the petition had been delivered at the Council Office without the privity of a great number of those who were mentioned in it, and that Mr. Billingsley had the authority of a small number of them only, to desire to withdraw it. The substance of the Attorney General's final judgment was, that the petitioners had by their Act power to purchase lands, but that such power was limited to the purpose for which the Corporation was erected; and that the transaction which had taken place in respect of the subscription for granting annuities and life assurances was foreign to the ends of the incorporation, of a "very dangerous tendency, and highly in derogation of the royal prerogative"; and for which reason the Corporation was liable to prosecution.

A caveat against the petition was entered by the Corporation of the Amicable Society; and on being heard against this and the Hallet scheme, they submitted that a second charter, which must necessarily interfere with them, should not be granted.

In urging this plea, the Amicable had to say something of their own history; and it may be useful to quote that portion of their statement which has reference to it, and particularly for the better information of some foreign readers of the *Assurance Magazine*, because it is evident, from many instances within knowledge, that foreign writers on insurance subjects generally give the *Amicable* the credit of having been the first Society established for granting what is properly known and intended by the term "a life insurance"—i. e., the guarantee, by an insurer, of a fixed sum payable upon the decease of a given life, in consideration of the payment by the insured of a premium regulated according to the *age* of the life. But the *Amicable* Corporation was not invested with the power of granting insurances at rates of premium calculated according to *age*, until after 30th October, 1807;\* nor was it empowered to grant an insurance for a fixed sum until after so recent a period as the 8th May, 1845.†

Without entering into details of the changes in plan which about a century and a half of time necessitated, the account of its establishment, given by the Amicable on the occasion first referred to, is sufficient to show that on its original formation it was not a Life Insurance Society, but a Benefit Institution for the creation of a corporate purse, by means of the contributions of members all subscribing a like annual sum, and settled portions of the contents of which purse were to be divided from year to year, and in equal proportion, between the representatives of those contributors who might happen to die within each business year for the time being.

The statement of the Amicable in 1720 was as follows:—

"That they were a Corporation created by letters patent, 5 *Annæ Reginae*, which did constitute a number of persons, not exceeding two thousand, to be a body politick, with power to purchase lands not exceeding the yearly value of two thousand pounds, and to raise a joint stock for the use and relief of widows and orphans, in the manner and under the regulations therein mentioned": and "That the members of the Corporation of the Amicable Society for a perpetual Assurance Office did begin to act under their said charter in the year 1706, and have continued to act ever since; and the directors for the time being have admitted members, granted

\* *Vide* the *fourth* of its six charters,—viz., of the above date, 48 Geo. III.

† *Vide* "An Act to enable the Corporation of the Amicable Society for a perpetual Assurance Office to lend Money upon Mortgage for the purpose of Investment, and also to confer other powers upon the said Society"—8 Vict., *cap.* viii.

policies on lives, and improved their joint stock at interest on Government securities and otherwise, which now amounts to £50,000 or thereabouts; and that the said Corporation have made annual dividends to the claimants of the members of the said Corporation who have died in each year since the charter was obtained, according to the directions thereof; and that in the year 1710, and ever since, the said Corporation hath divided £10,000 per annum amongst the claimants; and that in the year 1707, or 1708, several persons endeavoured to get another charter for insurance on lives, but that the same was stopped at the Great Seal, on hearing counsel for the said Amicable Society for a perpetual Insurance Office."

Attorney General Lechmere concluded his laborious task of reporting on the various petitions by stating, in reference to the last on the list—viz., the Hallet Insurance scheme\*—that he was of opinion it was not advisable for his Majesty "to erect any such Incorporation as is therein desired."

On the 27th April, 1720—that is, five weeks after the date of the Attorney General's report—Mr. Hungerford reported from the Committee to the House of Commons. The report included reference to twenty-two projects for fisheries, insurance, &c., and amongst these figures a Cornhill scheme for insurance of goods from thieves and robbers, not unlike a plan advertised in the London papers in December, 1853.

This *second* Report of the Parliamentary Committee is in the Journals of the House (*vide* pp. 341 and 351, volume xix., reprint of 1803). It was also reprinted, at least as far as relates to the portions relating to insurance, by Sir Frederick Morton Eden, in his pamphlet *On the Policy and Expediency of granting Insurance Charters*.† This reprint did not, however, include the *first* or fully detailed *SPECIAL Report of the Committee*, which was not inserted in the Journals, but was printed separately by order of the House of Commons, under the terms of their resolution of 18 March, 1719 (*i. e.*, 1720 N. S.)

There is no doubt that the *Special Report* (printed by Tonson, and extending over some 80 folio pages of minute and personal details), however dry and uninteresting, except to a very few, it may now be, was full of interest and point at the period when it appeared, viz., during the excitement engendered by the South Sea bubble. The number of copies printed was probably small; these,

\* *Vide ante*, and p. 130.

† Privately printed, London, November, 1806, small 8vo., pp. 80. Sir F. M. Eden, Bart., was the first chairman of the Globe Insurance Company, and author of the learned and remarkable work entitled *The State of the Poor; or, an History of the Labouring Classes in England from the Conquest to the present period*, &c. 3 vols., quarto. London, 1797. For further particulars respecting his labours as regards insurance matters, *vide* subsequent remarks, *passim*, and Appendix to the present article, No. II.



from various causes, would be very liable to destruction, which will sufficiently account for the rarity of the document at the present day.\*

Resuming our consideration of the proceedings of the Committee, it will be observed that their final resolutions (put upon the records of the House) were only two in number. The first of these had reference to the undertaking proposed to be carried on under the name of the "British Fishery," which it was resolved would be productive of certain good results, and highly deserved encouragement. The House resolved to postpone this, and the *second* resolution of the Committee was then read a second time; and it was resolved, *nemine contradicente*—

"That the House do agree with the Committee in the said resolution, that for some time last past several large subscriptions having been made by great numbers of persons in the City of London, to carry on public undertakings, upon which the subscribers have paid in small proportions of their respective subscriptions, though amounting in the whole to great sums of money; and that the subscribers having acted as corporate bodies, without any legal authority for their so doing, and thereby drawn in several unwary persons into unwarrantable undertakings; the said practices manifestly tend to the prejudice of the public trade and commerce of the kingdom.

"ORDERED,—That leave be given to bring in a Bill to restrain the extravagant and unwarrantable practice of raising money by voluntary subscriptions, for carrying on projects dangerous to the trade and subjects of this kingdom; and that Mr. Secretary Craggs, Mr. Walpole, Mr. Comptroller, Mr. Chancellor of the Exchequer, and Mr. Hungerford, do prepare and bring in the same."

The Government used great expedition in carrying the Bill through its various stages.† It passed through the Commons in eleven days, and through the House of Lords and the process of obtaining the royal assent in as many more, becoming law in the Act 6 Geo. I., cap. xviii., the title of which is—"*An Act for better securing certain powers and privileges intended to be granted by his Majesty by two Charters for Assurance of Ships and Merchandizes at Sea, and for lending Money upon Bottomry; and for restraining several extravagant and unwarrantable practices therein mentioned.*"

The preamble of this Act contains an almost verbal repetition of the views of former legislation on the nature and advantages of marine insurance. It proceeds to aver, that it had been found by experience that much ruin and impoverishment had ensued from

\* The only copy I have met with is the one in my own possession, which has been the most important source of reference for many of the facts reviewed in this article.

† *Vide Journals of the House of Commons*, vol. xix. of reprint of 1803, pp. 355, 357, 358, 361, 365, 366, 368.

particular persons (i. e., private underwriters) becoming bankrupts, or failing to comply with their policies—that if two several and distinct Corporations, with a competent joint stock to each belonging, were erected for assurance of ships, goods, &c., and likewise exclusive of such Societies or partnerships as now are or may hereafter be entered into for that purpose) several merchants or traders, who adventure their estates in such ships, goods, &c., would think it much safer for them to depend on the policies or assurances of either of those two Corporations so to be erected and established, than on the policies or assurances of private or particular persons.

The occasional failure of private underwriters had certainly been established in evidence before the Parliamentary Committee; but although the Government alleged this as one reason for the establishment of Insurance Corporations, the business of private underwriting was not further interfered with; and the preamble of the Act adds, “that such merchants or adventurers as shall hereafter be minded to agree for assurance of their ships, goods, or merchandizes with private or particular persons, may still be at liberty so to do according to their own option or choice.”

The Government of 1720 did not in any way foster the establishment of Insurance Companies, *without at the same time taking ample guarantees for the fulfilment of the engagements which such Companies might enter on.* Their former Attorney General (Lechmere) had, perhaps with over-caution, advised that only one of the petitioning bodies should be incorporated. The Crown, influenced by the support which two separate and apparently equally respectable bodies of petitioners had obtained, granted two charters. On the other hand, the Crown was more cautious as respects the amount of capital to be raised; for whilst the Attorney General had been of opinion that the capital of the one Corporation he recommended should be of less amount than its proposed £1,200,000, the Crown decided on giving the two Corporations power to raise a capital stock of £1,500,000 each.

It will be recollected, that the third and final recommendation of the Attorney General was that the Corporation *should not be made in any way exclusive of others.\** The Crown, however, dic-

\* The Select Committee of the House of Commons on Marine Insurance which sat in the session of 1810—and whose Report, dated 18 April, 1810, was ordered by the House of Commons to be reprinted, 11 May, 1824—examined thirty-six gentlemen, including representatives of the chartered Companies, merchants, brokers, and others interested in the business, and resolved, that it was their opinion “That the exclusive privilege for marine insurance of the two chartered Companies should be repealed, saving their charters and their powers and privileges in all other respects, and that leave should be given to bring in a Bill for this purpose.”

tated otherwise; and it would probably have been ruled to be unconstitutional to discuss the principle whether an exclusive privilege should be granted, when the charters to be issued upon its prerogative were to be *bought* by the petitioners. Money was wanted, and we may reasonably suppose that at the period it would not have been paid except for a monopoly.

The twenty-nine clauses of the Act 6 Geo. I., cap. xviii., include the various heads of the charters granted to the Royal Exchange and London Assurance Corporations, and declare that after the 24th June, 1720, all undertakings tending to the prejudice of trade, and all subscriptions, &c. thereto, or presuming to act as corporate bodies without legal authority, and all acting under obsolete charters, &c., shall be deemed illegal and void, public nuisances, "and moreover, shall incur and sustain any further pains, penalties, and forfeitures, as were ordained and provided by the Statute of Provision and *Præmunire* made in the sixteenth year of the reign of King Richard the Second."

As the whole tenor of the Act 6 Geo. I., cap. xviii., is of much importance in the history of insurance, and as many of the readers of the *Assurance Magazine* will be glad to have an outline of it before them, I annex, with an occasional note or two, the following abstract of the contents of its clauses, as printed in its margin in the original:—

"I. His Majesty may grant charters to two distinct Companies for assurance of ships, and for lending money on bottomry.

"To have perpetual succession, but subject to redemption.

"They may choose their own governors, &c.

"The first governor, &c. to be appointed by his Majesty; to continue in their places for three years, &c.

"To have a common sale.

"May purchase lands to the value of £1,000 per annum.

"May sue or be sued.

"II. Each of the Corporations to pay into the Exchequer £300,000, for discharging the debts of the civil list.

"Times of payment.\*

"III. On failure of payment at the times of payment, Corporation may be sued.

"Ten per cent. damages, with full costs of suit.†

"On non-payment for thirty days, Corporation may be determined.

"IV. Each Corporation to provide a sufficient stock to answer all demands on their policies.

"On neglect may be sued, &c.

\* The whole was to be paid within ten months from the date of the charters. Particulars as to the default in this respect on the part of the Corporations are contained in Sir F. Eden's pamphlet.

† This means ten per cent., in addition to the instalments of the £300,000 in default.

"V. Each Corporation to raise a capital stock not exceeding £1,500,000.\*

"VI. How the capital stock shall be raised.

"All subscribers entitled to a share in the capital stock.

"VII. Corporation may raise calls of money from their members, in proportion to their stocks.

"Penalty for not answering calls.

"VIII. Each Corporation may take up money under their common seal, to advance money on parliamentary securities.

"The bonds or obligations granted by the Corporations not chargeable with stamp duty.

"IX. Shares in the Corporations transferable and devisable.

"Stock a personal estate, and to go to the executors.

"X. Stock not to be taxed.

"Governors, &c. may be members of Parliament, &c.†

"XI. His Majesty may empower them by charter to make bye-laws, &c.

"XII. During the two Corporations, no other Societies may assure ships or lend money on bottomry.

"Penalty for assuring after 24th June, 1720.

"Penalty for lending money upon bottomry.

"XIII. Forging the common seal of the Corporations, or any policy, &c., felony.

"XIV. None may be governor, &c. of both Corporations at the same time, or purchase stock in both Corporations: penalty.

"XV. On three years' notice at any time within thirty-one years, on payment of the £300,000, the Corporations may be determined by Parliament.

"XVI. Afterwards, if the Corporations are judged inconvenient, his Majesty may determine them.

"XVII. No other like Corporations grantable.

"XVIII. After 24th June, 1720, all undertakings tending to the prejudice of trade, and all subscriptions, &c. thereto, or presuming to act as corporate bodies without legal authority, and all acting under obsolete charters, &c., shall be deemed illegal and void.

\* The power here given was not fully acted upon, the paid-up capital of the Royal Exchange Office being at the present time (1854) £689,220, stock, and that of the London Assurance £425,000 (*vide* Wetenhall's Stock List).

† This is an imperfect definition of the clause, which contains a more important feature, viz. (using the words of the Act):—"And that no person which shall be governor, director, or other officer of either of the said Corporations to be erected as aforesaid, shall for that cause only be disabled from being a member of Parliament, nor shall in respect of such share or shares be or be adjudged liable to be a bankrupt within the intent and meaning of all or any the statutes made against or concerning bankrupts; and that no stock in the said respective Corporations shall be subject or liable to any foreign attachment by the Custom of London or otherwise, any law or statute to the contrary notwithstanding." It is only reference to the charters that would show whether similar exemptions from the bankruptcy statutes apply to stockholders who are not governors, directors, or other officers; but it is remarkable that the above clause was not worded in a more inclusive manner. As an example of a much more precise and general exemption in an Act of Parliament as to an insurance charter, *vide* the 14th section in the Act 39 Geo. III. (1799), usually called the "Globe Charter Act," but which was not eventually acted upon, exempting *all* members of the projected Corporation, to which that Act empowered the King to give a charter, from any liability to the statutes respecting bankrupts which could otherwise arise by reason of their being members of the Corporation. Respecting the Act just referred to, *vide post*, p. 315.

"XIX. All such undertakings deemed public nuisances, and shall incur a *præmunire*.

"XX. How merchants or traders may have their remedy against the undertakers.

"XXI. Penalty on brokers buying or selling shares in such undertakings.

"XXII. Not to extend to undertakings settled before 24th June, 1718.

"XXIII. Nor to prejudice the two Corporations hereby erected.

"XXIV. Or the South Sea Company.

"XXV. Nor to restrain the carrying on of any home or foreign trade in partnership.

"XXVI. *South Sea* and *East India* Companies may advance money on bottomry to their captains, &c.

"XXVII. Not to extend to Corporations formerly created, or to any subscriptions to be made to the capital of the *South Sea*.

"XXVIII. Salvo for East India Company's privileges.

"XXIX. Companies not to lend money to the Crown but on credit of Acts of Parliament, under penalty."

Sir Frederick Eden included in his pamphlet (before referred to) very full particulars of the subsequent history of the charters granted under the above Act. We have space for but one extract :

(Page 21)—"The insurance charters were scarcely granted, when they became liable to forfeiture. The Act had provided that the consideration to be paid into the exchequer should be discharged by instalments in the following manner, namely :—

£100,000 within one	} calendar month after the date of the charter ; i.e., before	} { the 22nd July, 1720 ; the 22nd Sept., 1720 ; the 22nd Nov., 1720 ; the 22nd Feb., 1721 ; the 22nd April, 1721 :
50,000 within three		
50,000 within five		
50,000 within eight		
50,000 within ten		

that on non-payment for thirty days of any of the instalments, the Corporation might be determined. Both Companies failed in their engagements with the public; and, acting by concert even in their failure, they each paid into the exchequer, previously to the session of 1720–1, the sum only of £111,250, or little more than one third of the stipulated consideration; and it was stated that they were not able to fulfil their contract with Government "by reason of the great pressure on public credit, and the great losses they had suffered by failure of the South Sea scheme." (*See* the 7th Geo. I., c. 27, § 26, and the petitions from the Royal Exchange and London Assurance against the Globe charter in 1799 and 1806.—*Commons Journals*.) That they adventured very deeply in that speculation, there can be little doubt; and it is extremely probable, from the consideration of dates and circumstances connected with the application to Parliament, that they expected (as a witness before the Committee of the House of Commons expressed himself respecting the Royal Exchange undertaking) "to get a great estate at once by blowing up their stock"; and as the principal managers of the two Insurance Companies were deeply concerned in the South Sea Company, we may reasonably suspect that investments in their

stock were the source contemplated from which the bonus to his Majesty's Civil Government was to flow. It has already been mentioned, that the reports of the Attorney General on the proposed charters were dated in March, and that the two Companies were incorporated on the 22nd June, 1720. It was precisely in this interval that South Sea stock rose to 800 per cent.; and soon after Midsummer, though it fell (as was supposed, in consequence of the writs of *scire facias* having been issued against the various unchartered projects then afloat), it was raised, by the promise of splendid dividends, to nearly 1000. In August it fell; and in September, the time for paying the second instalment of £50,000, the bubble burst. On this bubble the Insurance Corporations were raised; and on its bursting they could not discharge their debt to the Crown. The business, too, of insurance at that period was unfavourable to them. It is stated in Postlethwayt's Dictionary, that "in consequence of the loss of twelve Jamaica ships in the month of October, 1720, the London Assurance stock (on which only ten per cent. was paid at first, and which had risen to 160 per cent.—i. e., sixteen times the capital actually subscribed) fell in that month to 60; and, other losses happening soon after, to 15 and even 12 per cent.; and towards the close of that year, this promising Company scarcely existed, but in the complaints made by proprietors against their directors."

By their second charters, of 1721, the two Corporations were released from all liability in respect of the further contributions in default, upon making up their total payments to £150,000 each—that is, to half the amounts originally contemplated.

Between the years 1721 and 1761 the extent of their fire and marine insurance business was considerable, but such was far from being the case as regards *life* insurance. An affidavit made by Mr. Savage in 1761 set forth that the Royal Exchange Assurance, from the time of its commencement to that date (i. e., in a period of about 40 years), had received for life insurance premiums only £10,915. 2s. 2d., and had disbursed in losses on life policies £8,263. 17s. 8d. These premiums were for what are termed short-period risks, insured against for generally a year or lesser period. Taking this element into account, the above receipt of premium shows that the gross *sum insured* on the average of years was not more than £5,000 per annum or thereabout, being half the amount which Life Companies have now been for many years in the habit of insuring on a single life. There is no ground for assuming that the business of the other Corporation was more extensive; in fact, although there were at this period several Associations in activity for the grant of insurances of survivorship *annuities* to widows, and of deferred *annuities* for old age—and the history of which Associations, their quarrels, competitions, and downfall, may be seen in the writings of Dale, Dr. Price, and others—nevertheless, there is no doubt that the insurance of a *sum* payable at death was, at the time we are referring

to, a contract very rarely entered upon, either by the commercial or other classes of the community; and we may take it as established, that no plan of life insurance, in its proper form of development as an assured provision of a fixed minimum amount of money payable at death, whenever that may occur—the risk thus extending from the date of the insurance being effected, up to the expiration of the *whole term* of life—had been contemplated by a Company or Society, or had been considered by any legislature in Europe, prior to the year 1760, when discussions ensued in England preliminary to the formation of the Equitable Society in 1762. Without entering into the details of the establishment of that Society (and which are pretty well known, although the name of its working promoter, Edward Rowe Mores, is but seldom associated, as it ought to be, with Dodson and Price), it will be necessary to note, for the information of some readers of this *Magazine*, that the *Equitable* was the first Society that granted policies, and for the whole term of life, at rates of premium graduated according to the varying mortality computed as in expectation at the different ages of the lives insured. Thus the principles which guide modern plans of insurance were established. This was the great step in advance—the foundation on which so vast a superstructure has since been raised.

The Attorney and Solicitor General reported on the 14th July, 1761, upon the petition for a charter for the Equitable. Their Report has been reprinted, but without any comment or explanatory remark, in the first volume of the *Assurance Magazine*.\* It was also inserted by Sir Frederick Eden in his pamphlet, and prefaced by these remarks:—

(Page 51.) “As a precedent, this Report is entitled to all the respect we are accustomed to pay to legal authority; but when judicial officers, in communicating their decisions to the public, condescend to state the reasons on which they are founded, it becomes the right of every person interested in the examination to inquire how far these reasons, whether of law, of fact, or of policy and expediency, are incontrovertible. Readers who are not ravished with the whistling of a name, and who do not admit infallibility to be attached to the signatures of *Pratt* and *Yorke*, will not find in this Report those proofs of sound argument, acute legal learning, or constitutional knowledge, which distinguished the first of these eminent men a few years after, in his judgment on the question of general warrants; or which had distinguished the latter of them, a few years before, in his *Treatise on the Law of Forfeiture*.”

Eden then gives in detail the reasons for his conclusions. It seems to me, however, that on weighing the for and against on

\* *Vide* page 89 of the *second* Number.

both sides of the argument, the impression will not be so very adverse.

The petitioners for a charter for the *Equitable* had proposed "to raise a capital by investing the premiums, together with a small additional sum of forty shillings to be deposited by every person insured, to answer all losses; and by way of further security, to oblige every person insured to become a member of the Corporation, and to declare or covenant that he will bear his proportion upon any call, if the premiums and deposits should prove deficient."

The Attorney and Solicitor General considered this proposed manner of raising a capital to be "a fatal objection"; and expressed their conviction, "that whatever else may be hazardous, the capital or fund to answer losses ought to be certain, and liable to no casualty." In the general truth of the latter opinion, and in the undoubted desirability of the certainty of capital in proprietary Insurance Companies, Sir Frederick Eden's writings and course of action prove him to have fully coincided: but his strictures on Pratt and Yorke were principally based on his views of the total inapplicability of their remarks to the case of the *Equitable* or to any mutual or *contribution* Society whose insured are mutual insurers of each other; the profit and the loss, whatever they may be, being their own, and their fortunes mutually pledged to make good all deficiencies in meeting liabilities.

When Eden criticized Pratt and Yorke's Report, it would seem that he did not sufficiently reflect on the fact of that Report having been written before even the infancy of the modern system and practice of life insurance. The *Equitable*, as already stated, was the first to try the experiment of whole-term life insurances upon premiums calculated according to the ages of the insured; but the scheme was only *in embryo* when the Attorney General and Solicitor General had to report on it, and consequently they had not the advantages which Eden possessed, when, writing in 1806, he passed a high and justly merited eulogium on the *Equitable*, basing the same upon his knowledge of the results experienced in the more than 40 years' practice of that Society since the date of the Report in question.

Although in the Report there are manifestly some blunders in expression, and some palpable, but, considering all circumstances, excusable mistakes about tables of mortality, &c., on the whole, it may be viewed as neither derogating from the fame of its authors, nor as unjustified in its conclusions, when we have in mind the total



want at its date of any available experience in the business of life insurance except in its most imperfect form, and that in aggravation of this want the Attorney General and Solicitor General had no proof, except something which took the shape of a negative one, of the possibility of profit from what were then professedly low rates of premium: besides, it was not certified to them that persons would become members of the Equitable in numbers sufficient to constitute an amount of contribution in entrance money, &c. large enough to form a capital, or to ensure the reasonable chance of success, from the association of the combined risk and fortune of a class considerable in magnitude and in means. It was not obvious to them that the Society had not been got up for the undue advantage of those members of more advanced ages whose decease would first entail the payment of claims, and leave the youngest lives and longest insured to participate ultimately in the diminishing benefits of a deficient treasury, as has been the friendless lot of too many members of so-called Friendly Societies. These were but a few of the points of the experiment which must have seemed doubtful, and were really quite enough to warrant the caution of the Crown lawyers, even though they had been in their time, and with its experience, as deeply versed in political economy as was Sir Frederick Eden with the accumulated experience of his laborious studies and indefatigable industry in that branch of science.

Passing from these subjects of disputation, this much is certain, that the Report of the Attorney General and Solicitor General in 1761 is valuable as a precedent expressive of the then settled views of the law officers of the Crown upon the necessity for paid-up capital in the case of all Insurance Companies.

These views were participated in by the first legislative council of a foreign country which had to entertain a scheme for life insurance. The particulars which prove this, are contained in the *Arrêt du Conseil d'Etat du Roi,\* du 3 Novembre, 1787, qui autorise à perpétuité l'établissement des assurances sur la vie, avec privilège exclusif pendant quinze années.* One of the most prominent observations in this edict is the paragraph in which, with reference to the guarantees which should be afforded, it is stated—

“Sa Majesté a d'ailleurs été informée que la concurrence devint funeste à ces sortes d'établissements, dans les pays où ils y furent livrés à leur origine: leur succès, en effet, ne peut être plus efficacement assuré que par la prompte réunion d'une multitude de chances; mais, quoique ces assu-

\* Louis XVI.

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rances doivent être calculées de manière à tirer leur solidité complète de la réunion des chances, elle a cru qu'il seroit utile de soumettre ceux qui seroient chargés de cet Etablissement à une finance considérable, dans laquelle chacun des assurés ait un gage authentique des engagements pris avec lui."

A knowledge of the circumstances out of which arose the edict from which the above is quoted, is essential to the student of the history and progress of insurance. Any notice of the edict, except a casual slight reference by one or two French authors, has been entirely wanting. I have, in the hope of supplying this defect, made a translation from the original, and annexed it to the present paper, with an explanatory note (*vide* Appendix, No. 1, p. 349, *post*).

The British legislature soon had another opportunity of expressing its decided opinion regarding the question of capital of Life Insurance Offices, and of the distinction to be drawn between really paid-up and partially paid-up (or subscribed) capital. This cannot be better described than in the words of Sir F. Eden:—

"In the year 1789 a Bill was introduced into Parliament, to incorporate one hundred gentlemen by the name of 'The Westminster Society for granting and purchasing Annuities and Insurances upon Lives and Survivorships,' with a joint stock of £300,000, to be paid in shares of £3,000 each, on which the sum of £1,000 was to be paid within twenty-one days after the first general meeting of proprietors, and the remainder at such times as it should be called for. It was further provided by the Bill that £100,000 should be immediately invested in the Three per Cent. Consolidated Bank Annuities, and the further sum of £10,000 in the like manner annually, until the full sum of £200,000 of Three per Cent. Consolidated Bank Annuities should be purchased; that this fund should not be alienated without the authority of Parliament; and that the Society should not divide more than their net profits. The Amicable Assurance opposed this Bill; and the arguments of their counsel, Mr. Graham, against it, and of the present Attorney General in its favour, are reported in Debrett's *Collection of Debates (Parliamentary Register, vol. xxv., p. 566)*. The principal objection to it was, that its capital, professing to be £300,000, would in reality be no more than £100,000; and it is remarkable that one of the arguments used on this head strongly applies against all unincorporated Offices—namely, 'that the capital held out might prove a fallacy, if not properly guarded against; since the subscribers, from insolvency and various other incidental chances in life, though perfectly solvent at present, might not be able to advance the second and third thousand pounds when called on; and in that case the real capital would be no more than the one hundred thousand pounds.' The Bill passed the Commons, but was thrown out in the Lords upon the motion of the Chancellor (Lord Thurlow), who, among other objections, stated that in his opinion the capital proposed to be raised was not a sufficient security for the public" (*vide* Debrett, vol. xxvi., p. 290)."

The Westminster Society, thus failing in the endeavour to

obtain a charter, was established three years after—i.e., in 1792—by the usual plan of a deed of settlement, and parliamentary consideration of insurance matters was not called for further until the lapse of a few more years, when an important occasion occurred for their discussion.

In April, 1799, Sir Frederick Eden, and twenty other gentlemen of parliamentary and commercial influence, presented to Mr. Pitt, then Chancellor of the Exchequer and Premier, a memorial containing the particulars of the plan of a new chartered Insurance Office, to be called “The Globe or General Insurance Office,” and to be instituted for the following purposes:—

“I. For insurances against fire, for assurances on lives, for granting annuities, endowments for children, and provision for widows and old age, upon the payment of specific sums or periodical subscriptions.

“II. For providing for the widows and children of the clergy, by periodical subscriptions and donations from such clergymen as choose to avail themselves of the benefits of this institution, and from others, as shall be regulated by charter. (This fund to be administered by the Office under the control and superintendence of respectable members of the Church, or of such officer as they shall appoint.)

“III. For assisting and improving Friendly Societies. For this purpose the Office will agree to receive such funds as Benefit Clubs may entrust to it; to allow interest thereon, not exceeding five per cent.; to keep a running account with the treasurers of such clubs, and to faithfully administer such contributions and donations as the masters and employers of servants and labourers shall deposit, periodically or otherwise, at the Office, on account of Friendly Societies, or for other charitable purposes. To Friendly Societies connected with the Office, the following advantages will arise:—Relief, on equitable principles, to persons of all ages and occupations; the removal of that restraint on personal liberty which Friendly Societies in general impose on their members, by confining the benefits they hold out to persons residing within a certain district. Members of Societies connected with the Office will be enabled to transfer their interest from one club to another, to proportion their periodical subscriptions to their respective wants and abilities, and to contribute specific payments or periodical subscriptions.

“IV. For promoting industry and frugality among the labouring classes, by enabling them or their employers to deposit, peri-

odically or otherwise, at the Office, such sums or proportion of their earnings as they shall think proper, for which interest at a rate not exceeding five per cent. will be allowed; and the engagements of the Office made payable one month after sight."

The memorialists then submitted that, to enable them to carry these objects into execution, his Majesty should be empowered by Act to grant a charter, and that by such Act "they should be authorized to raise a capital stock not less than half a million sterling, nor more than one million."

The memorialists then agree, "that in case the said capital stock shall be raised, £300,000, part thereof, shall be laid out in the purchase of the land tax on houses, in such manner as shall be directed by the said Act; and that one half of the net profits of the Institution, after paying all expenses and an annual dividend of five per cent. to the proprietors, shall be laid out in the same manner: provided, that in the purchase of the land tax upon houses the Office shall receive all the advantages to which owners of land are entitled by the Act for the redemption of the land tax; and provided, that the Office shall not be required to lay out more of their profits than £700,000 in such purchase."

The memorial concludes by submitting that it would greatly tend to the encouragement of the Institution and the benefit of the public, if the bills, bonds, and other securities, to be given or received by the Office on account of Friendly Societies, the fund for providing for the widows and children of the clergy, and on account of deposits made at the Office for the benefit of the labouring classes and other charitable purposes, were exempted from the duties chargeable by the Stamp Acts on such instruments.

The *whole* of the preceding plan received the sanction of Mr. Pitt, and a letter from the Lords of the Treasury, signifying their approval, was addressed to Sir Frederick Eden under the date of 10th May, 1799. On the 5th June following, a petition was presented to the House of Commons for leave to present a petition for incorporating the Globe Insurance Office; the petition was then presented and read, and a Committee was appointed to consider, examine, and report. The report was read the next day, and leave was given to Mr. Wilberforce Bird, Mr. Williams, and the Lord Mayor, to prepare and bring in a Bill. The Bill was presented, 13th June, and read a first time, and on the 17th June was read a second time and committed. On the latter day, a petition against it from the Amicable Society was read. On the 25th June

Mr. Wilberforce Bird reported the Bill from the Committee, with amendments. These amendments were agreed to, and added to the Bill, but did not however interfere with its main objects. The only alteration in its course worth referring to is, that whilst no definition of the time within which deposits should be reimbursable was given in the Globe Bill, and although it was still a question whether the deposit class contemplated in the project came within the scope of the Bank Act, it was finally deemed expedient that the Globe should include the limiting clause, that all deposits made by individuals should not be payable by the Corporation at a less period than *six* calendar months from the time such deposits should have been made. This clause was accordingly inserted in the Globe Act, and did away with the probability, (though, as it turned out, it did not obviate the possibility,) of the Bank of England viewing the deposit class as an infraction of the 9th section of their Act of 6 *Queen Anne*, c. 22, and which runs thus—"It shall not be lawful for any body politick or corporate whatsoever, erected or to be erected, other than the said Governor and Company of the Bank of England, or for other persons whatsoever united or to be united in covenants or partnership, exceeding the number of six persons, in that part of Great Britain called England, to borrow, owe, or take up any sum or sums of money on their bills or notes payable at demand, or at any less time than *six months* from the borrowing thereof."

On the 26th June, 1799, the petition of the London Assurance against the Globe Bill was read. On the 1st July, upon the order of the day for resuming the adjourned proceedings on the third reading of the ingrossed Bill, several amendments were made by the House to the Bill, and it was "Resolved—That the Bill do pass, &c." On the 12th July, it was reported to the House of Commons that the Lords agreed to the Bill; and on the same day, prior to the speech at the close of the session, the royal assent was given to the "*Act (39 George III., c. 83) for enabling His Majesty to incorporate, by Charter, a Company to be called 'The Globe Insurance Company,' for Insurance on Lives, and against Loss or Damage by Fire, and for other purposes therein mentioned.*"

This Act is a very comprehensive and important specimen of insurance legislation. Our limits will only allow of the briefest sketch of its general import. On the one hand, extensive powers were to be given under it to the Company, with the view of most

fully carrying out the objects submitted in the original memorial of its projectors,\* which, it will be recollected, instead of being confined to the ordinary branches of business, viz., the grant of fire and life insurances and annuities, were intended also to assist Friendly Societies, charitable and benevolent institutions, clergymen's widows and children's funds, and depositors among the industrious classes and others.†

The only other advantage, besides the authorization to carry on such business and trusts under royal charter, was to consist in the security to its subscribers or proprietary from any personal responsibility beyond the amount of their shares in the paid-up capital stock of the Corporation.

This being the sum of the advantage to the Company, it will be interesting to observe, on the other hand, what were the benefits which the Company, in its turn, offered to the public and the Government.

1. No exclusive privilege was asked for by the Company—its founder, Sir F. Eden, having uniformly held and expressed the most enlightened and liberal views against monopoly.

2. As the guarantee of the good faith of its intentions, and as a permanently available security for the liabilities it proposed to undertake, the Company was to have a real capital stock of not less than £500,000, nor more than £1,000,000, the whole of which was to be paid up within two years and a half from the date of incorporation.

3. The provisions of the Act set forth in the completest manner the method and principles of the administration of the Company, and its transactions were annually to be submitted to the review of Parliament.

4. The peculiar advantages which the public finances would gain, from the conditions of the Globe Charter Act rendering it imperative that £300,000 should, within three calendar months of the capital of the Company being raised, be invested in the purchase of land tax upon houses, and that one half of the net profits arising to the Corporation, after payment of five per cent. to the proprietors on the capital stock, and of all salaries and other expenses, should be laid out in the purchase of land tax, until the sum of £700,000 were thus invested.

5. The public advantages which would have accrued from the

\* Quoted in a previous part of this paper, p. 313.

† In addition to the treasurership of the funds of such Societies and classes, the Act extended its operation to the funds of Tontine Societies and other institutions for granting future advantages.

part of the project which related to Friendly Societies, and to the reception of the deposits of the industrious classes, repayable at the expiration of a period not less than six months. The subject of Friendly Societies is so closely allied and identical with that of insurance, that it is an equally appropriate theme for discussion in the pages of this *Magazine*. On this particular head I am glad to be able to annex an extract, from an original minute before me, of Sir F. Eden's exact words on the subject,\* and which are important as those of the person best acquainted in his day with the then position of Friendly Societies.

He observes as follows :—

“ The national importance and utility of the last two branches of business proposed to be carried on by the Company, it is hoped, will be readily admitted.

“ With respect to Friendly Societies, the giving effect to their operation is a measure of the soundest policy. These Societies however, in themselves, are confessedly inadequate for the purposes which they have in view, and are therefore not generally encouraged by the labouring classes. It is conceived that an Office, permanent, solid and respectable, and possessing the best means of collecting those mathematical data by which the allowances of Benefit Clubs should be regulated, may render these institutions more popular, and their advantages less equivocal.

“ It is proposed that the Company shall receive deposits as low as five shillings, for which interest at a rate not exceeding ——— will be allowed, and that such deposits should be payable after six months. A small fee will be required on registration, and a deposit may at any time be converted into an annuity or insurance.

“ This branch of business, it is conceived, will be, particularly in the metropolis, highly conducive to frugality, order, and morality. A place of safe custody at which a proportion of the earnings of labour may be deposited, periodically or otherwise, will be of great consequence to servants. Deposits made by them will be regarded by their employers as an additional security for good behaviour and character.

..... “ That this deposit class is of itself not likely to prove a lucrative concern to the Company is sufficiently obvious, for, it is believed, no instance can be produced of any set of persons having ever attempted in this kingdom to set up a bank at which deposits should be payable at a period not less than six months after they were received. The benefit which the Company will derive will arise from an extension of connection and an increase of various branches of insurances, such as endowments for children and provision for widows and old age,” &c.

The charter, leave to grant which was given under the Act of

\* Eden devoted much time, trouble, and expense in procuring statistical and other details on the position of these and other Societies affecting the welfare of the poor and labouring classes. There is an interesting chapter on Friendly Societies, in his great work on the poor referred to in a previous note of the present paper. I have somewhere seen the remarks that work contains on the early origin of these Societies, and his own comment and translated passages of Hickee's *Thesaurus*, misquoted, and without acknowledgment.

Parliament we have been considering, has never been granted. I mention this because, although it may be a fact known to many readers of this *Magazine*, there are others, and particularly its foreign subscribers, to whom the circumstance of the projected charter is unknown, or else is even mistaken as having led to an actual incorporation of the Company (and of which mistake we have an example in a very recent English work)—such an impression having no doubt arisen from reference to some writers on insurance and commerce who have alluded to the Globe Charter Act of Parliament without mention of the subsequent proceedings on it, and which extended over a period of nearly eight years (1799–1806). As brief an outline as will contain the facts of the case is all that can now be generally interesting.

The petition to the King to grant a charter in the terms of the Act was referred, by the Duke of Portland's minute of 23rd July, 1799, to the consideration of the Attorney and Solicitor General (Sir John Mitford and Sir William Grant). These law officers did not report until the 4th December following, and then the purport of their report was to raise objections to the charter, unless a new Act were passed imposing penalties if the Company should exceed the powers granted them by charter.

It seemed to the projectors of the Globe, that additional clauses, subjecting the charter to forfeiture in such case, would meet these objections without the necessity for another Act of Parliament; and on the 17th December they petitioned the King accordingly, and the matter was referred to a Committee of the Privy Council.

A great many of the above referred to objections were quite untenable when the test of argument was applied to them. I annex two specimens of the objections and of the substance of the answers offered.

**OBJECTION.** "The Act has required that the Company shall employ £300,000 in the purchase of land tax, but it contains no provision to prevent the immediate resale of the land tax so purchased; and it appears to us that if the Company shall be permitted to sell at a discount, they may greatly injure the sale of the land tax, as they are by the Act authorized to purchase at the same price as the landowners. It seems to us, therefore, important that they should be prohibited to sell any land tax for less than the price paid for it, &c."

**Answer.** "The petitioners think no injury can arise to the public from their exercising the power granted them by the Globe Act of selling their land tax if they should think proper. N.B. The land tax they are to purchase must be land tax on houses, which is not a very marketable commodity, and not likely to be purchased from them by any persons but the owners of the houses."



Sir F. Eden's personal opinion on this objection was even more decidedly worded. He considered that "yes" might be answered to the objection,

"If it is expected that *strangers* will ever purchase under the present terms; but who will ever buy land tax from the Globe except owners of land? and how will their buying their own land tax injure the general sale? Is it not desirable that the Company should be enabled to sell them land tax, and thus take it out of the market for ever? Instead of restraining us from reselling, would it not be more politic to pass an Act to enable us to buy as much land tax on houses (and even land tax) as we pleased, upon the same terms as owners? It is much more probable that such a power would act as a *stimulus* to the landholder, than that any person unconnected with the property out of which the land tax issues could be so enamoured of it as to purchase under present terms."\*

OBJECTION.—"The Governor and Company of the Bank of England, and the private bankers, having objected to the proposed charter, under an apprehension that it would enable the Company to act as a bank, the petitioners have stated to us that they disclaim all intention of so acting, and have declared themselves willing to submit to any restrictions in this respect. To effect this purpose, and particularly to prevent the interference of the proposed Company with the charter of the Bank, we think it will be necessary to prohibit their acting in any manner whatsoever as a bank, except in receiving deposits according to the express words of the Act, and to make their evasively acting as a bank for all purposes, which it seems to us may easily be done under the terms of the Act. Without some more specific prohibition, it seems to us that penalties ought to be imposed on the directors, cashiers, and officers of the Company who shall discount any bills or answer any draught in respect of any deposit before the expiration of six months from the date of the deposit, on any pretence whatsoever; but this also appears to us to require the sanction of Parliament to effect.

*Reply of the Petitioners.*—"Will not forfeiture of the charter be a sufficient penalty? The branch of deposits, payable at six months with interest, was introduced for the express purpose of benefiting the industrious classes; and it is conceived that (in the metropolis more particularly) it will prove highly conducive to frugality, order, and morality. A place of safe custody at which a proportion of the earnings of labour may be deposited, periodically or otherwise, will provide (what no Institution has yet provided) an equivalent for the use of small sums, either in the shape of interest or in the shape of a provision either for superannuation or widowhood. Such an Institution will prove an useful instrument of police, and probably mend both the condition and morals of servants; deposits made by them will be regarded by their employers as an additional security for good behaviour and character. This class does not interfere with the Bank charter nor with the business of any banker whatever."

An amended charter was then drawn up: the newly appointed Attorney and Solicitor General (Sir Edward Law and Mr. Spencer

\* The "land tax," which by an Act of Parliament passed in the previous session was made *perpetual*, was purchasable at twenty years' purchase, or five per cent.; but at the time of the proposal of the Globe charter, the British Funds gave six per cent. to the purchaser, and, rallying in price soon afterwards, still gave five per cent. nearly, for some years. (F. H.)

Perceval) were requested to report, which, after many deliberations and hearing of petitioners for and against the charter, ended in their report of 8th February, 1802. This addresses itself mainly to the explanation of the conclusion "that the terms on which the petitioners are now content to take the charter will remove all those objections mentioned in the report of Sir John Mitford and Sir William Grant, upon which their opinion of the necessity of further application to Parliament seems to have been founded." The explanation of the reasons for this favourable opinion comprises an elaborate inquiry into each of the ten heads of objection just referred to. There is one point which may be referred to here. We have before noticed the singular exception which the law officers took as to the £300,000 to be invested in the purchase of land tax. Doubts had been raised by them whether such an investment could be considered part of the guaranteeing fund, which the Globe Charter Act had stipulated should be "ready money or shares of parliamentary stocks or public funds." The Globe petitioners were prepared to plead that the purchase of land tax came within the purview of that definition; and that a public fund or a share in a parliamentary stock, being a right of the public creditor to an annuity or a certain portion of the public taxes, and distinguishable from a right to any specific principle from any fund whatever, this equally applied to the land tax, which, having been made perpetual, was as much a public fund as the Three per cent. Consolidated or Reduced *Annuities*.

Notwithstanding the soundness of this proposition, it does not appear to have been sufficiently convincing to the law officers; with the view, therefore, of removing all question, the Globe petitioners offered that a clause should be inserted in their amended draft charter, providing that, over and above the capital agreed to be invested in the purchase of £300,000 land tax, an additional capital of £500,000 should be invested in the funds;" and that if, upon occasion, it should become necessary for the Company to resort to this capital for the payment of their debts, and any part thereof should have been so applied, it shall be unlawful for them to make any dividends amongst the proprietors till such capital of £500,000 shall have been reinstated."

This offer for the enlargement and permanency of the funded capital quite satisfied Sir E. Law and Mr. Perceval, and they introduced provisions for the purpose into the draft of the charter which they laid before the Privy Council. But the Privy Council had unforeseen difficulties to deal with, in respect of the constitu-

tional question whether a charter, granted under an Act of Parliament authorizing the grant of a royal charter for *specific purposes*, could be amended or altered by the *omission* of any of those purposes. This had special reference to the omission of the deposit plan. I have already referred to the objection of the Bank of England and bankers to this part of the original proposed charter, have quoted Sir John Mitford and Sir W. Grant's idea of the necessity for further parliamentary interference, and mentioned the offer made by the Globe petitioners to entirely waive this part of their plan. We must now refer to the report of Sir E. Law and Mr. Perceval to the Privy Council; and it will be seen that they expressed themselves in most decided terms in favour of the Globe petitioners. The following are their words on the subject:—

“The ground of this objection appears to us to be fully and effectually removed by an offer on the part of the petitioners to relinquish all claim on their part to be incorporated for the purposes which have excited this jealousy on the part of the Bank of England and the private bankers, and to be expressly restrained from ‘receiving deposits of the funds belonging to and acting as trustees thereof for Benefit or Friendly Societies, and other charitable and benevolent institutions; and for making provisions for the widows and children of the clergy, and for clergymen; and for the receiving deposits from or on account of the members of the industrious classes of society, and others;’ and from acting as a bank in the same or in any other respect or capacity whatsoever, upon pain of dissolution; which penalty, together with the criminal responsibility which the individual members would incur by presuming to act as a Corporation for any purposes other than those which are immediately authorized by their charter of incorporation, or, at any rate, for purposes expressly forbidden by their charter, appears to us sufficient to obviate the objection on this head.”

On the 21st January, 1803, a Committee of the Lords of the Privy Council\* took into consideration the petition for the amended charter. Counsel stated the readiness of the petitioners to accept any amendments or restrictions which the Bank of England might deem advisable to introduce in the draft charter. The approval of the law officers of the Crown to the amendments proposed by the Bank was signified. The Solicitor of the Bank of England stated the willingness of that Corporation to withdraw their caveat against granting the amended charter. Counsel made a like proposition as regarded the caveat of the bankers of London and Westminster. The question of petitions for and against had, however, now to give place to the difficulties—insuperable, as it appeared—arising out of the proposed amendments in the purposes of the charter,

\* Present—The Lord President, Lord Glenbervie, Mr. Chancellor of the Exchequer, Sir William Wynn, Sir William Scott, and Mr. Corry.

omission of any of which purposes gave rise, as has been before observed, to constitutional questions; and the final result was, that the Privy Council, in March, 1803, stated that it was "not expedient" to grant the proposed (amended) charter.

The Globe Insurance, consequently on this termination of the charter proceedings, was established under a deed of settlement of 2nd June, 1803, and has been further empowered under its special Acts of Parliament, 47 Geo. III., c. 30; 47 Geo. III., Sess. 2., c. 87; 49 Geo. III., c. 123; and 7 Vict., c. 39. Although not incorporated, its founders determined that it should not for that reason deviate from the principle with which it was projected—viz., of offering the fullest possible security for the maintenance of its engagements. It was therefore instituted for all the branches, except the one for deposits, contemplated in the Charter Act. Its capital was fixed at £1,000,000 sterling: the whole of this sum was fully paid up within the first three years from the date of its institution; and when it is borne in mind that this was effected during a most eventful war period, and when investments in the English Funds yielded five per cent., no stronger proof can be required of the full public appreciation of the advantages of the employment of real capital in the business of insurance.

As early as 1802, Sir F. Eden made an elaborate estimate of the amount of property insurable from fire in Great Britain and Ireland. His calculation then was, that £601,975,000 represented the approximate insurable property in 1801, whilst about £233,000,000 only were then insured; and that there was at that period room and need for more Joint Stock Companies, but without exclusive privileges.

Attempts at estimation of the insurable property in other countries have sometimes been made—for instance, for France by Baron Dupin; but these do not, like that of Eden, state the method and statistical authorities on which they are based. A quotation of the details of Eden's estimate would, I am sure, give the readers of this *Magazine* a high opinion of the careful manner in which he considered insurance subjects. Being, however, desirous of quoting from his writings an entire specimen which would be more nearly connected with the matters referred to in the present article, I have preferred to include in the Appendix (*vide App., No. II., post*), his remarks on personal and unlimited responsibility. These remarks include so masterly an exposition of the peculiar inferiority of such security to that afforded by real and permanent capital, in insurance business, that their publication at the present moment, when

it is again a question for the legislature, may prove useful; and even if not, there need be no excuse for furthering the wider dissemination of the eloquent and able arguments submitted by Sir F. Eden in his discussion of the way in which statesmen should deal with that question.

On the subject of the amount of property insured in its ratio to the amount insurable, it was shown that in 1803 the aggregate sum insured in Great Britain against sea risk was about £100,000,000, but that this amount was not half the sum insurable; and under the circumstances, as to this and other branches of insurance, and, further, with the view of affording the security so necessary in the case of grants of life annuities (a branch of business in which the Government are themselves competitors), the Globe Insurance Company presented to the Government, in 1806, a memorial setting forth some of the facts above referred to, and stating their desire to be incorporated for *marine*, fire, and life insurances, and for granting and purchasing annuities, in consideration of which they expressed themselves to be "willing to raise a capital not less than one million and not exceeding two millions, such part thereof to be invested in the public Funds as the legislature may direct; and that one hundred thousand pounds, part of such capital, shall be paid into the receipt of his Majesty's Exchequer within three calendar months after the Act for incorporating the proposed Company shall have received the royal assent."

The Lords of the Treasury approved of the terms of this plan, and signified, by letter, their opinion that it would be proper to submit an Act to the consideration of Parliament, and that the portion of the capital to be invested in the Funds should be not less than one million Three per Cent. stock.

A Bill, the draft of which was approved by the Counsel of the Privy Council as well as by the Treasury, was brought before the Commons. It proceeded to a second reading, and this was debated, and carried by 74 against 20,\* and the Bill referred to a Committee in usual course; it was, however, too late in the Session to proceed further, the Committee adjourned *sine die*, and the matter was not brought before the notice of the House at any subsequent Session.

Sir Frederick Eden did not survive to 1810, otherwise he would have seen the full realization of his ideas on the subject of non-

\* Sir Theophilus Metcalfe, Deputy Chairman of the Globe Insurance, moved the second reading, supported by Chancellor of the Exchequer Lord Henry Petty (the present Marquis of Lansdowne), Mr. Alderman Combe, Mr. Paull, and Mr. Alexander; and opposed by Sir John Anderson, Sir W. Curtis, Mr. Grenfell, and Sir C. Price, on the ground that the Bill would be an infringement upon the rights of the London and Royal Exchange Assurance Corporations. All the above spoke on the occasion.

exclusive charters, and the justice of his protests, borne out by the recommendations of the Committee of the House of Commons in April, 1810, and these finally led to the Act passed in June, 1824 (5 Geo. IV., c. 114), and which repeals so much of the Act 6 Geo. I., c. 18, as restrains any other Corporation than those in the Act named, and any Societies or Partnerships, from effecting marine insurances and lending money on bottomry.\*

In drawing to a close the preceding review of various circumstances connected with the past history of insurance legislation, the present time, in which we are in expectation of the introduction of a new Insurance Bill being brought forward by Government as soon as the Report of the Commission upon the general law of Joint Stock Companies shall have been presented, offers an appropriate occasion for considering what are the essential points of difference between past and recent legislation on Insurance institutions. No further preface is perhaps required to the following :—

REVIEW OF SOME RECOMMENDATIONS OF THE SELECT COMMITTEE  
OF THE HOUSE OF COMMONS ON ASSURANCE ASSOCIATIONS,  
1853.

The facts which have been adduced will have shown that formerly the main object was uniformly the devising of such regulations as were suited to secure a real assured guarantee that the savings of the prudent and provident classes of the community should not be ultimately endangered. Acting under such a view, no parliamentary sanction or appearance of approval was ever given, except to such projects as were to be supported by ample and real capital, so as to place as far beyond doubt as possible not alone the *intention* of the insurers to have forthcoming the material guarantee for the fulfilment of the contracts they enter upon, but also to afford, at the very outset, the tangible and convertible security of capitalists; so that, if loss occurred, it might fall in the first instance upon those undertaking the administration of the contracts, and participating in the advantages which may in the beginning have accrued therefrom. This implied no more than that the possessors of capital are its legitimate guardians, and the most proper of trustees for the protection of the capital of others. Impressed with a practical view of

\* An Act of the following year, 1825 (6 Geo. IV., c. 19), repealed the Act of 6 Geo. I., c. 18 (the heads of which Act, commonly called the Bubble Act, have been recited in a previous part of the present article, page 305), so far as to substitute the dealings and judgments of the common law for the liability to and extreme penalties of the statute of *præmunire*, happily never revived in any other enactment.

his nature, and not entirely confiding in that utopian development of perfectibility which would entrust the charge, liabilities, or profits of the trade in money to those who are unable or unwilling to risk any of that commodity themselves, the legislature, by their "Act to regulate Joint Stock Banks in England" (5th September, 1844), laid down very salutary rules, which, so far as concerns the question of capital, prevent any Joint Stock Banking Company in England commencing business until a capital of *at least* one hundred thousand pounds has been subscribed for in shares of £100 each, the deed of partnership fully executed, and, which is most important, the sum of *fifty thousand pounds*, or one half of any larger capital, *really paid up*, and such paid-up capital rendered *permanent* by the provision that it shall not be lawful for the Company to repay any part of the sum so paid up, without leave of the Lords of the Committee of Privy Council for Trade and Plantations.

But on the selfsame day that this cautious enactment took effect, an Act deserving a diametrically opposite character was passed, containing no effectual regulations either as to the amount of capital and its permanency, or as to the guarantees to be afforded of the general *bona fides* of the members of partnerships, joint stock, and mutual Societies, established for other purposes than those of banking.

This Act (7 & 8 Victoria, c. 110), for the registration, incorporation, and regulation of Joint Stock Companies—so runs the title—affected a much wider range of undertakings than the Joint Stock Banking Act passed on the same date, for it concerns every partnership of more than 25 members, every Life, Fire, Marine, Casualty, and Annuity Society, and every Friendly Society insuring a sum exceeding £200 on one life—always excepting Companies empowered by statute or charter, or authorized by statute or letters patent, to sue and be sued in the name of some officer or person.

Insurance Companies, with the exception of those acting under special Acts of Parliament or charters, were thus most prominently adduced by the legislature as amongst the kind of Society coming under the category of those general partnerships in which enterprise is the primary, and capital the secondary, recommendation.

This was a change indeed from the spirit of all legislation on the subject of insurance antecedent to June, 1844. Previously to that date, the responsibilities involved in an insurance contract had always been made matter for grave and careful consideration; and the guarantees to be required from those embarking in the business of insurance had been as cautiously deliberated on, and their

necessity inculcated, in, relatively, as decided a way as in the business of banking. Parliament, in its dealings with insurance matters, had hitherto (as has been sufficiently shown in the facts referred to in the foregoing pages) acted on such a principle, and had admitted it by the precedents of earlier times, when (referring to life insurance alone) risks were only taken by insurers for terms not exceeding one year, renewable only *de anno in annum*, on fresh approval of the life insured. In regard to limited risks of that nature, a more exceptional case than in other trusts of limited duration did not perhaps arise; but the same remark does not apply to the more modern practice of life insurance, and of which there is but half a century's active experience, for there the acceptance by an Insurance Company of one annual premium for a *whole term of life* policy, entails upon the Company liabilities of trusteeship, as far as respects the fulfilment of the contract, which may possibly last 80 or more years; and this does not mean that the liability is an *accruing* one from year to year, in which each space of time will only involve its own specific liability, but implies far more. It being the practice, and arising out of the very necessity of the case, to charge an equated constant rate, instead of an annually increasing contribution for the policy effected at the outset for the whole term of life, it follows, from the process of calculation, that in the first payment to the insurer of an annual premium, as well as in each subsequent like payment, there is included a portion of the future premium not only for the current year, but for each future ensuing year, received in hand and in advance, for *reservation, accumulation, and permanent trusteeship* during periods of time, which, in the case of young lives insured, may last four-score years or more.

The public are generally too little aware of these elements of the proper practice of life insurance, to attach to them the importance which they will in the end command; and the legislation of 1844, which, as far as respects insurance, "leaves individuals to take care of themselves, while it affects to watch over their interests," contributed to the formation of mistaken ideas on the part of the public as to the principles involved in insurance contracts being of as ephemeral and as speculative a nature as those of many of the thousand and one kinds of undertaking which may be carried out by partnerships without the predication of length of years as their condition.

The Select Committee of the House of Commons on Assurance Associations, which sat last year, have in their Report of 16th



August, 1853, affirmed the necessity of permanent capital, in contradistinction from the legislation of 1844, which ignored it. The words, however, in which that Committee state that the capital is to "be considered in the double light of a test of *bond fide* intentions on the part of the promoters, and of a security for the liabilities of the Company at the early stage of existence," whilst they are calculated to be of some use, are not particularly appropriate to the exigencies of the case, combined as they are with prefatory remarks to the effect that only such check should be interposed for the security of the public (*query*, the insured?), and of the Companies themselves, as will give a reasonable guarantee of such intentions. If permanency of *intentions* be the main point to be dealt with, why is reference made to the capital being a security for the liabilities of the Company at the *early* stage of its existence? Apart from the seeming paradox in these words—and from the graver question, as to whether the amount of the guaranteeing capital recommended by the Committee is in any way sufficient—there is no doubt that, if the above-quoted words of the Report be introduced into an Act of Parliament, they will be taken as a convenient precedent for saying that the retention of the proposed minimum capital, and which (to use the words of the Report) "shall be invested in the public Funds, under such regulations as Parliament may deem fit to enact," would be an arbitrary proceeding if enforced in the *middle* and *advancing* stages of the existence of Companies. The periods of existence just mentioned are more essentially those, in which the enlarged scope of operation, the accrued liabilities, and the effect of the laws of mortality acting upon masses of lives of advanced ages, and of the rate of interest realizable upon investments, require, to say the very least, greater care and larger available means both of reserve and of power to meet liabilities, than in the first years of the establishment of Insurance institutions. *Caveat emptor*, if their early existence is to be the sole crucial test: it may suit the intentions of promoters, but will it realize the hopes of the insured?

The Select Committee of 1853 have recommended the reversal of the insurance legislation of 1844; and there is reason for congratulation at the decided opinion they have expressed,

"That the business of Assurance Companies differs so much from ordinary business, that it will be advisable to repeal all the provisions of the Joint Stock Companies Act so far as they relate to Assurance Societies, and to deal with them in a separate Act."

In reverting, however, to the principle which dictated former

legislation—viz., the necessity for real capital—the recommendation of the Committee fixes upon so small a *minimum* sum, that it may well be doubted whether its amount (£10,000) is not wholly disproportioned to the magnitude of the operations embraced in the ordinary business of English Insurance Companies.

It should be observed that the Report states,

“Your Committee feel that perhaps the most important part of their inquiry is that which refers to the precautions which should be hereafter adopted with regard to the formation of new Companies. On the one hand, your Committee feel that the ground hitherto occupied by these useful institutions has been comparatively limited, and that their application is capable of a great extension, not only in the higher and middle classes of society, but also among the humbler classes, to whom it has recently been very considerably applied; and that it is therefore very important that no check or impediment should be placed in the way of the further extension of this enterprise, not absolutely needful for the security of the public.”

The subject here referred to in the Report is certainly very important to all those who are concerned in the prospects for the future of existing Companies, as well as in those of new Offices to be hereafter formed. Something like a definite idea of the extent of the interests involved may be gained from a few brief facts.

1. There are, as nearly as possible, 200 *Life Insurance Offices* in their full state of activity at the present time, and the aggregate amount of the sums insured by them on lives cannot be estimated at a less sum than one hundred and fifty millions pounds sterling.

2. There are about 140 more Offices, now only provisionally registered, and out of which number we are justified in assuming, that some 50, more or less, will shortly attain to complete registration.

3. The number of *Life Insurance Companies* likely to be in existence prior to the earliest period at which any fresh statute regulating insurance can be passed may thus be approximatively taken at 250.

4. Although the total of the *nominal* subscribed capitals of *Life Insurance Companies* can be ascertained, this is not the case as regards the actually *paid-up* proportions of such capitals possessed by the different Companies. There are, however, data which indicate that the average guaranteeing capital in a paid-up form, of the proprietary Companies established prior to the Registration Act of 1844, is upwards of one hundred thousand pounds for each Company. As regards the proprietary *Life Offices* established since the Act of 1844, there is reason for assuming that their paid-up capital is on the average below ten thousand pounds for each; and

this small sum has, in the case of several of the Companies, ceased to exist in point of fact, if the proper reserve for liabilities incurred be deducted from the funds presently in hand.

In respect of the general question as to capital employed in insurance business, there are certain practical views which bear upon its solution much more forcibly than the theoretical purisms which are sometimes urged on this point. It will be well to inquire what would be the comparative effects, if the average capital of the 250 established, or about to be established, Offices, were £50,000 for each Company. This would make up an aggregate capital of £12,500,000. The state of investment applicable to funds of this description may be taken as producing an average rate of four per cent. interest, and the average dividends they pay as at five per cent. There is consequently a difference of, say, one per cent., or £125,000 per annum, for remuneration for the risks incurred by proprietary shareholders. On the other hand, the very circumstance of the combination of means, exertions, and connections of the proprietary, bring to the general capital and business, advantages, which, in pecuniary as well as in other respects, are cheaply paid at £125,000 per annum. In such a view of the case it might fairly be contended that the asserted burden of capital is, speaking generally, an imaginary and not a real subject for complaint.

With the above limitations, let it be for the moment assumed that the charge implied in the possession and retention of the above amount of capital is to be taken as an absolute one of £125,000; then let it be required to ascertain how it compares with the other necessary expenditure inseparable from insurance business. The average expenses of conducting Companies cannot be taken at a more moderate amount than £3,000 per annum for each Company, irrespective of charges for agency commission. Such an estimate corresponds with the view taken in vol. iii. p. 217 of this *Magazine*, where it is stated, in an article by the Editor—

“An influential board is very important, and an establishment of some pretension is all but essential. Experience has pretty well proved, that these and all the other adjuncts of a respectable Society can scarcely be got together and maintained at a less charge than three thousand pounds per annum, so that the income from annual premiums must be at least thirty thousand pounds per annum before the annual charge can be reduced to ten per cent.—a sufficiently heavy deduction, it will be admitted.”

The annual charge for 250 Companies, at the rate just referred to, would thus amount to £750,000; and the pressure of such a sum on their resources would consequently be really six

times as heavy as that arising, in the way before pointed out, from the possession of £12,500,000 of guaranteeing capital; and when allowance is made for the advantages in the way of business arising out of the *permanent* influence of capital, it may fairly be asserted that the providing of the remuneration for its guarantee bears but a very small ratio to, and an easily to be supported proportion of, the current expenses of Life Insurance Offices.

The Select Committee have recorded their "opinion that no new Company shall be admitted to complete registration until a capital shall have been subscribed, and actually paid up, of at least ten thousand pounds, and which shall be invested in the public Funds, under such regulations as Parliament may deem fit to enact." One of these regulations would clearly have to be a provision for the permanence of the capital under some such Government control as in the case of the Act for Banking Companies. The important features of this recommendation of the Committee should be separately considered.

1. The Committee do not mention any provision as to the amount to be paid up on each *share* into which the capital is to be divided, so that it would be as competent for a promoter of a new Company to have the capital subscribed for in ten thousand shares of one pound each, as in two hundred shares of fifty pounds each. Whilst this latitude would be allowed in subdivision of the risk of the individual proprietor, no limit would be imposed as to the extent of liabilities which the collective proprietary might guarantee, as far as capital is concerned, with the £10,000 paid up. For example: a proprietary of one thousand shareholders, holding an average of £10 each, or a proprietary of fifty shareholders holding an average of £200 each, might either insure sums on lives to the extent of one hundred thousand pounds or to the extent of ten millions or any larger sum.

If so low a *minimum* amount as £10,000 of guaranteeing capital were fixed upon, surely some sliding scale (say, at so much increase for so much insured) would be desirable; and there need not be much fear of attaining too high a *maximum*, seeing that the possibility is very remote of many Companies which now exist obtaining and maintaining any such exceedingly large amount of business as to make the progressive guarantee inconvenient.

The inconveniences which, whilst the law of partnership remains as it is, arise from not fixing on a *minimum* amount being paid up on each share, are too obvious to require further notice. In the Act regulating Banking Companies these were effectually

provided against ; and the arguments in favour of the precautions there taken equally apply to the case of Insurance Companies.

2. The Committee do not recommend the investment of the guarantee capital of £10,000 in any other way except imperatively in the public Funds.

The *rationale* of this would appear at once to proceed as a necessary consequence of the difficulty of finding investments of any other satisfactory kind for such *small amounts* for each Company, and to lead to a direct conclusion as to the impolicy and proportionately great expensiveness of such a course. Its inconveniences can easily be proved. The peace of the world being now disturbed, violent effects upon, and fluctuations in prices of, securities, must be expected as the normal state of things. Where then will be the permanency of the minimum capital of £10,000 ? It may be invested in Consols at the price of 92, and, when needed for realization to meet liabilities, may sell at 50 or 60, as was the case in former times of war. Say this is the case with Company A, and that its capital of £10,000 is, when needed, exposed to these unfortunate circumstances, and the Consols, which were invested at 92, sold at 55. The depreciation of 37 per £100, Consols, is here equal to a depreciation of about 40 per cent. on the above investment, so that the guaranteeing capital which the insured have to look to is £6,000 instead of £10,000. Then take the case of Company B, and let precisely the reverse conditions apply. Here the £10,000 capital is invested in Consols at 55, and when wanted is sold at 92. The investment thus produces nearly £17,000, money. So much the better for the creditors : but take the instance in which Company B may not require its affairs to be wound up, and has honourably and prudently conducted them for a considerable number of years, say as a country Office established in some market town, and that a rival Company, C, starts in the same town. Under the statement of the Committee as to the need for capital in the *early* years of the establishment of a Company, the Office B would have a right to say, We are in an advancing period of our existence, but Company C is but just commencing business ; why then should an amount of Consols which is worth £17,000 be required in deposit from us, whilst only £10,000 worth is required from the new Company ?

There is another inconvenience arising from the investment in the public Funds of the entire guarantee capitals of a large number of Companies—viz., that such kinds of investment yielding on

the average about 1 per cent. less interest than investments in other securities, the additional burden (if capital can be called such) on the finances of the Company would amount to a very considerable sum.

Our legislature might advantageously consider the practice of the State of New York in regard to this point. It will be seen on reference to the law of that State—passed 10th April, 1849,\* entitled “An Act to provide for the Incorporation of Insurance Companies”—that ample power is given for investments being made on first class mortgages instead of in public funds; and this power is fully affirmed by the subsequent Act of the same State passed 8th April, 1851. Had the capital to be provided by each New York Company been fixed at £10,000, it would doubtless have been found unadvisable to recommend such an option; but the American law does not deal with so comparatively insignificant a sum. No Life Insurance Company whatever, be it of native or of foreign origin, can transact business in the State of New York without a *paid-up* capital of one hundred thousand dollars (*i. e.*, £25,000), invested in funded securities or “mortgages on unencumbered improved real estate situate within that State, and worth at least 50 per cent. more than the amount of the mortgage thereon.” Whilst it is very questionable whether such a provision can be justified in regard to its operation on foreign Insurance Offices—the term ‘foreign’ here meaning not only Companies whose head quarters are out of America, but also Companies belonging to any of the other States of the Union—it is at the same time observable, that even larger guarantees are required in the case of Companies instituted in the State of New York itself.

The New York law of 1851 is printed at full length in the *Appendix* to the Report from the Parliamentary Committee of last year, but only an extract is given from the seventh section of the law of 1849. There are, however, some important items in the latter law which have not been brought to the particular notice of the Select Committee, in reference to the amount of paid-up capital which it is thought expedient to provide for. On collation of the Act of 1849 with that of 1851, so as to make the proper allowance for the portions of the former repealed by the latter Act, it will be observed that the following conditions apply respecting capital:—

No Joint Stock Company organized for life, fire, or marine insurance in the city and county of New York and county of King’s can have a smaller capital than one hundred and fifty thousand dollars (£37,500) paid up.

\* Seventy-second Session, c. 308.

No Joint Stock Company established in any other county of the State, nor incorporated by any foreign Government, can have a less capital invested in the State of New York than one hundred thousand dollars (£25,000).

"No mutual Marine or Fire Insurance Company can commence business, if located in the city of New York or county of King's, until agreements have been entered into for insurance with at least one hundred applicants; the *premiums* on which, if it be marine, shall amount to three hundred thousand dollars (£75,000), or, if it be fire or inland navigation, to two hundred thousand dollars (£50,000), and notes have been received in advance for the premiums on such risks, payable at the end of or within twelve months from date thereof, which notes shall be considered a part of the capital stock and shall be deemed valid, and shall be negotiable and collectable for the purpose of paying any losses which may accrue or otherwise."

Companies on the mutual plan belonging to other States, &c., must have similar agreements and provisions for premiums amounting to one hundred thousand dollars (£25,000).

"No Company formed for doing the business of life or health insurance on the plan of mutual insurance shall commence business until a cash capital of one hundred thousand dollars (£25,000) shall have been paid in and actually invested, either in the stocks of the incorporated cities of the State of New York, the stocks of the State or of the United States, or in bonds and mortgages on cultivated farms worth double the amount for which the same is mortgaged; the value of the land to be appraised by three disinterested commissioners, appointed by the first Judge of the county where such Company is to be located. Farm buildings to form no part of the valuation."

The foregoing extracts will show how necessary the possession of capital by mutual Societies is considered by the New York legislature. In tracing the principles and precedents in this respect in our own country, it should be observed that the original idea of a mutual Society was very different from what it now is. A mutual Society used to be considered as a contribution Society: for instance, in the deed of settlement of the Equitable Society\* (*vide* its clause 18) every person making assurance becomes a member, liable during the whole term of the assurance to bear and pay his or her part or share and proportion of any sum of money which during such term, by virtue of the regulations of the deed and its bye-laws, may be imposed on or called for from the members of the said Society, in proportion to their several interests therein." But the Equitable Society, it would seem, stands alone in this provision, which makes it really a mutually guaranteeing and responsible Society; and it appears that in regard to all other mutual

\* Enrolled in the Court of King's Bench, Hilary Term, 1765.

Societies the rights of the members are perforce restricted to the funds in hand, and that the definition of the Report from the Select Committee of 1853 is the true explanation of their status, viz., "Mutual Assurance Companies, where the claims of the assured are confined to the funds of the Society." It is just worthy of consideration, whether the words 'mutual fund,' instead of 'mutual Company,' or 'Society,' is not the proper designation of such a guarantee, limited to resources in hand.

As far as respects the usefulness of capital or of liability to contributions to meet losses, in the case of mutual Societies, one fact may be worth many arguments. I refer particularly to the case of the Mutual Fire Insurance Society of Montreal. This Society (one of high respectability), in the great fire in the city of Montreal, which took place in the months of June and July, 1852, incurred losses to the extent of nearly eighty-five thousand pounds, and every member was called upon for a very heavy contribution to make up that loss; whilst if it had been constituted as a mutual fund, with no liability beyond the sum in hand, the greatest distress and confusion would have occurred amongst the claimants on such a fund.

The foregoing abstract will have shown that the law of the leading State of the Union demands really paid-up capital of, on the average, more than three times as large an amount as was recommended by the English Parliamentary Committee of 1853, and that, in addition to this, there are precautions in the New York Act which virtually increase that proportionate excess, by confining the authority to act under such capital to one branch only of the business of insurance; whilst, in the absence of any contrary statement in the recommendations of the Parliamentary Committee, it is left indeterminate whether one capital of £10,000 is intended as the *minimum* on which to allow a British Company to effect insurances in two, three, or more branches of the business—viz., fire, life, annuities, &c.

Thus in America it is deemed necessary to take a guaranteeing paid-up capital of £25,000 to £37,500,\* for each branch of business transacted by an individual Company, and to impose stringent regulations for the permanency of such capital. These enactments, be it observed, were made subsequent to our legislation of 1844, which took no effectual precautions as to capital; and they certainly did not originate on the score of the extent of insurance business being greater than on this side the Atlantic, for the statis-

\* i.e., 100,000 dols. to 150,000 dols.



tical statements already published in this *Magazine* show it to be vastly inferior.\* It would appear that the laws of 1849 and 1851 arose from the circumstance of American jurists foreseeing in time the evil results which would flow from the abuse of the "*laissez faire, laissez passer*" principle, in such important contracts as those of insurance; and therefore determining to take the reasonable precautions calculated to improve the security of those valuable adjuncts to public and private economy, to give confidence in their stability, and to bar as much as possible the hazard of their retrogression.

The same practical reasons apply in as full a general degree to the case of the insurance institutions of this country, and in a greater special degree from the larger extension of their sphere of activity, and of their amount of sums insured; and last, but not least, from their setting the example in life insurance matters to the rest of the world.

Upon these and other grounds, some of which have been referred to in the previous portions of this paper, it appears to me that of the various sums which have been suggested as the capital for future Companies, the amount of fifty thousand pounds, as the minimum proportion of paid-up capital, has the best reasons in its favour. This amount of capital ought to be required for each branch of business transacted by the individual Company. The sum of twenty-five pounds, at least, should be paid up on each share constituting the capital, and the whole might be under the control of the Privy Council for Trade, as in the case of the capital of Banking Companies; and it would be advantageous if no larger an amount than £10,000 were absolutely required to be invested in the funds, as the remainder might then be advanced on mortgage and confer the double benefit of saving to the proprietors of capital and of advantage to landholders.

The greater part of the opposition which such a project encounters is from the fear of some presently existing Companies with smaller capitals being obliged to fall in with such an enactment, and finding difficulties in the way of obtaining the additional amount required. Retroactive legislation is perhaps to be deprecated, even if it went no further than to enact that £10,000 capital should be made up by all Societies. Something of the opposition also depends on an admission that the public would prefer those Companies possessing the minimum amount of capital required in a law on insurance: and, as respects the small minority who go so

\* Vide *Assurance Magazine*, vols. i., ii., and iii., &c.

far as to say that £50,000 is a ridiculously large amount of capital for an Insurance Company, they may live to see proof unmistakable of their error ; and, in the meanwhile, a compact may be made in the words of the maxim, " he shall laugh the best, who laughs the last."

The Select Parliamentary Committee of 1853 have recommended an annual registration of statistics, and a quinquennial registration of accounts and valuations ; but so long as there is such great diversity of treatment of assurance accounts—so long as some Companies put down as credits the same items of liabilities which other Companies properly charge as debits—so long as different rates of interest are assumed in these valuations—there will be reason to anticipate no good results from such a recommendation, and the evils which the Committee themselves complain of as having been the effect of the Act of 1844 in this respect will be increased rather than diminished, and the same endless discussions will ensue ; for, the more carefully and prudently a Company calculates its liabilities, the more necessary will it be for it to show that other Companies, who by different methods underestimate their comparative liabilities, by computing them in such a manner, as to rate of interest, &c., as to anticipate their profits and pretend to a much larger divisible profit at the time being, are not justified in so doing, if comparison on such grounds is to be instituted.

These discussions would be inevitable, because, if such underestimates of liability be left without gloss or comment, the public, wrongly deeming, from the more favourable appearance of things created by the underestimates referred to, that the Companies who have made them are in a more flourishing state than those Companies acting with greater caution, and maintaining a larger reserve, though showing a less present surplus, would in such case patronize the incautious to the detriment of the prudent Offices.

If, as in France, there were only five Life Insurance Companies in England, and each of these had similar statutes, conditions of insurance, and scales of premium, (as is the case in the French Offices), then one could understand the possibility of a law meeting the *desideratum* by requiring all valuations to be made at uniform rates of interest and mortality. If, as in America, there were a comparatively open field for the introduction of new principles of commercial regulation, it would be more easy to bring Offices under the working of such a system. Although this is, to a certain extent, practicable in the United States, there is notwithstanding, even there, a great want of power to effectually carry out

such an object; and the careful inquirer will find that, notwithstanding the apparent complication of the machinery employed by legislative enactments as to the publication of accounts by Offices in the United States, its efficacy is by no means admitted. Some good illustrations of this will be found in the following extracts from an article on insurance which appeared about two years ago in an American periodical of reputation :—

“ By some Companies in this country (*New York*) policies are carefully estimated, and assets balanced against matured liabilities, yearly. By others there is reason to believe that the liabilities have been rudely and *lumpingly* guessed at; and by *some* others still, it is probable no such estimation has been made or attempted in one way or another. As the principal executive officer of one Company lately expressed to the writer of this article his doubt as to the possibility of ‘fixing a value to an uncertainty,’ meaning by an ‘uncertainty’ a life policy, it is pretty certain that *that* Company gets on without calculating its policies.

“ Massachusetts has for several years required of Insurance Companies chartered in other States, and doing business within her limits, a statement of their affairs, to be sworn to, and lodged with the Secretary of State—but, unfortunately, *such* a statement as was conclusive of nothing in the case of Life Insurance Companies. It got merely a sort of puff advertisement, the figures of which indeed might all be true enough, and yet the Company be worthless. Her last legislature has passed a more stringent enactment, and in it required a return of the real liability of the Company as well as its assets. It is curious however to observe, and it argues the imperfect acquaintance with this subject which prevails, that this Act not only requires a return of the aggregate value of the policies on the first of July each year, but also the *present value of the future premiums* at the same date! This latter return, having nothing to balance against it, is of no significance whatever to the public,” &c. &c.

Without the exact terms of the insurance laws of the different States in the Union were compared, it would be difficult to say whether all the remarks in the above extract apply to their full extent; but they will sufficiently show that there is no general confidence created by the regulations as to publicity; and in a country like America, where there is such a wide range for the fluctuations of the rate of interest between that assumed in calculations for future years and the diminishing rate which may be realized eventually, there is the more reason to fear that the accounts published are often open to more serious objections than those above taken.

Reverting to England, it will be perceived that the Committee of 1853 refer to the ill results of the legislation of 1844 as respects accounts or statistics.

In a previous part of the present paper the words were cited of

a member of Parliament, who, referring to the same point, stated that "in the case of Life Insurance Companies a striking instance occurs of the indifference with which the law leaves individuals to take care of themselves, whilst it affects to watch over their interests."

The remainder of Mr. Warner's published remarks on the subject are as follows:—

"The vast sums invested in these Companies, and the eager competition among them, render it very desirable that persons intending to insure should have some means of ascertaining the real position of the Companies, and estimating their probable solvency. The law appears to recognize this necessity by enforcing the publication of an annual balance-sheet.\* A moment's reflection will show that such a balance-sheet is totally worthless, and only calculated to mislead both insurers and shareholders. It appears to contain all the transactions of the Company, but the information really required is withheld. If anything is to be known of the position of the Company, it can only be by the publication of a periodical statement, containing not merely their cash transactions, but an estimate of their liabilities founded on the actual value of the policies existing at the date of the account. This would not, perhaps, require to be made out so often as every year; but it must be evident that the publication of any accounts without this information is worse than useless."

It is certainly true, that statistics without accounts, or accounts without statistics, are each generally of little use, and sometimes worse than useless; but even if both are given together, will not the identical result obtain, unless both statistics and accounts are published in the most minute and searching detail; otherwise, what shall we have except deductions from erroneous, incomplete, or studiously defective premises? or, even supposing the premises to be complete, what comparative value is to be attached to deductions which, from various inherent causes, such as the different rates of interest employed, the greater or lesser margin added to the normal premiums, the varying age, conditions, deeds of settlement or Acts of Parliament, &c. of the Offices, are arrived at upon principles which are not analogous either as respects the primary bases of computation, or as respects the degrees of prudence and of honesty which have dictated them? It is tolerably patent to all, that such differences as are here referred to are observed in many of the published accounts (so styled) which are open to the public eye. But such published accounts usually come short of the detail which can satisfy that part of the public who desire to form an accurate opinion or to arrive at real and positive information as to

\* This may have been the intention, but it certainly was not the performance, of the Act of 1844.—F. H.

the relative position of Companies, even putting aside the question of what the personal responsibility of the shareholders may be worth; and it is a well known fact, that some of the worst possible specimens of such accounts are published as if they were recommendations to the insuring public.

Publication is thus no absolute test of *bona fides*; and, if unity of system were possible, even then it would be doubtful whether elaborate annual statements of the complicated affairs of hundreds of Companies would be either understood or much cared for, except as giving fertile field for as profitless debate as would be the case if private marine insurance underwriters, at Lloyds or elsewhere, were required to keep public ledgers and statistical abstracts, so that the insured, however trifling might be the risk he wanted protection against, might abandon those underwriters who had suffered severely in any particular circle of storms, and rather patronize those underwriters whose adventures might appear to have been attended with better fortune up to the time being.

The credit of bankers, carrying on their business with *sufficient capital*, has hitherto been found the better recommendation to their customers than any impracticable attempt to give general publicity to all their affairs: and in considering the question of the regulations to be established in the case of Joint Stock Banks, it is well known how decided were the impressions of the late Sir Robert Peel and others, on the subject, not only of the impossibility of devising any form of account which would not in the end be found wanting, but also of the unadvisability of even requiring such a form; and the consequent determination was, that the only province of Government in the matter was to take all possible precaution that those embarking in a branch of business formed directly out of the wants of capital, should permanently maintain an adequate amount of capital, as the test of their practical qualifications to become the guardians of the capital of others and to participate in the advantages, as well as guarantee the risks, of that guardianship.

In concluding these remarks on the several points of inquiry embraced in the Select Committee's Report, there remain four subjects which are of prominent importance. The following are the words of the Report, which we may arrange in the following sections for facility of reference in the subsequent observations upon them:—

§ 1. "That the ground hitherto occupied by these useful institutions has been comparatively limited.

§ 2. "That their application is capable of a great extension, not only

in the higher and middle classes of society, but also among the humbler classes, to whom it has recently been very considerably applied.

§ 3. "That it is therefore very important that no check or impediment should be placed in the way of the further extension of this enterprise, not absolutely needful for the security of the public.

§ 4. "It has been brought to the attention of your Committee, that the business of Assurance Offices is becoming every year of a more varied character. This your Committee regard as the necessary result of the advancement of the science on which it is based."

The statements above quoted are, in obvious intention, meant to affirm conclusions which, for the purpose of more extended inquiry, may be put in the form of these four propositions: viz.—

No. 1. That the public are not availing themselves, as much as they should be expected to do, of the advantages of insurance, comparatively with the opportunities afforded them, and with their means of profiting thereby.

No. 2. That there is immediate room and desirability for the formation of more new Companies.

No. 3. That the extension of the "enterprise," by formation of new Companies, should be fostered and made as easy as possible.

No. 4. That the varied novelties which Life Insurance Offices offer to intending insurers are really scientific discoveries, deserving of public patronage, and progressive towards further improvement.

It will be convenient to examine the preceding propositions in their reverse order.

As to the last (No. 4), if Life Offices only are in question, there is no doubt that the only important, universally useful plan which has been practically in favour during nearly a century, is the grant of whole term policies at fixed rates of premium equitably graduated according to age. Advancement in the science and practice of insurance, as well as a wider range of statistical information, has certainly been attained in recent years, and a great deal still remains to be learnt; but it can scarcely be contended that this has much to do with the extension of life insurance among the million. There is always, of course, a certain portion of the public which is captivated by the vaunted advantages of wonderful new tables, based on exclusive information, and got up regardless of expense. Then, again, specially calculated combinations of new kinds of options are very much in vogue, and give a kind of *brio* to advertisements and circulars. Prodigious results, too, are estimated to accrue from the novel plan of advertising for lives rejected by other Companies to present themselves for acceptance. It is not to be denied that all these novelties attract something of a *clientèle*

in the early existence of Companies ; and when some Offices in the march of competition engage to apply portions of their profits (always in prospect) to the relief of all the extraordinary ills the insurers with them are heirs to, so that the possessor of a policy, however small, "can never come to want"—when, in fine, we thus see the name of philanthropy paraded as the guiding genius of a commercial scheme—then is it time to inquire whether these are the proofs of advancement, or of a condition which deserves a different character.

The ordinary form of policy for the whole term of life will continue to be the staple of the business of all Life Insurance Offices, and no alleged new discoveries or applications of life insurance are likely to take its place. The Select Committee, in the paragraphs of their Report which refer to the subject of the varied character of the business of insurance, call attention to a circumstance which shows that too varied a character of business does not always carry with it a recommendation ; viz. (*vide* Report, page 7)—“But there is a class of business which some Offices have undertaken, viz., that of receiving deposits of money at interest, which appears to your Committee totally inconsistent with the business of life assurance.”

There are distinct precedents, in the opinions at an earlier period of the law officers of the Crown, showing that any scheme which mixes the functions of a Bank of Deposit with those of an Insurance Company used to be reprehended. It is important that such precedents should be again affirmed, notwithstanding there is not now the same reason for the Bank of England or Banking Companies or firms addressing interpellations to Government on this subject, as was formerly done when different conditions from at present regulated the banking business.

It is much to be regretted that the Select Committee did not, at this part of their Report, refer to another point which should be inconsistent with the business of life insurance, viz., the allowance of *excessively* high rates of commission—a malpractice which is known to be a growing evil, and which may materially injure the prospects of all life insurance business, if it be allowed to go on in a heedless race of competition. The Annuity Act (17 Geo. III., c. xxvi., sec. 7) laid down some very stringent regulations limiting the rate of commission on consideration money paid for annuities; and although a larger limit is safe in the case of life insurance premiums, there is also a *maximum* which ought not to be exceeded in it.

Passing to the next proposition (No. 3), viz.—That the extension of the enterprise by formation of new Companies should be fostered and made as easy as possible. This is so directly a corollary from the two propositions Nos. 1 and 2, and is so entirely dependent for its affirmation upon whether it be shown that there is room for new Companies, or probability of their success contemporaneously with the success of the many new Companies already in existence, that it may appropriately be considered at the same time as the two first propositions, an examination of which will close the present article.

It will be desirable here to repeat the terms of the propositions just referred to:—

No. 2. That there is immediate room and desirability for the formation of more new Companies.

No. 1. That the public are not availing themselves, as much as they should be expected to do, of the advantages of insurance, comparatively with the opportunities afforded them, and with their means of profiting thereby.

It should be kept in mind that the conclusions of the Select Committee were, “that the ground hitherto occupied by the Insurance Companies is comparatively limited,” “capable of great extension,” and that the “further extension of this enterprise” is therefore very desirable. These are the expressions in brief; the words have been given at full length in other parts of the foregoing remarks.

Although the Select Committee observed that they felt “that perhaps the most important part of their inquiry is that which refers to the precautions which should be hereafter adopted with regard to the formation of new Companies,” it is clearly shown, by the conclusions above referred to, that they leaned towards the idea of there being a vast present field for the extension of life insurance in Great Britain, such a field as could be profitably and beneficially worked in by a greatly increased number of labourers beyond those now employed—and that the degree of public benefit would be in some measure proportionate to the augmentation in the number, as well as to the extent of the operations, of life insurance underwriters.

To arrive at well grounded conclusions on this head, we must endeavour to obtain an approximate view of the extent to which the field for life insurance is already occupied. The year 1851, having been made a year in which many countries took a census of their population, will be a convenient period for an estimate of the



comparative degree in which life insurance is patronized by the three leading nationalities of Europe—viz., British, French, and German.

The sum insured on lives in Great Britain and Ireland may be taken as about one hundred and fifty millions in 1851; that in Germany, at eight millions; and that in France, at one million sterling.

The proportion borne by the sum insured to the whole population of Great Britain and Ireland may thus be estimated at *five pounds eight shillings and six pence* as the average sum insured, in its ratio to each individual of the population.

For Germany (including the countries not in the Zollverein) the ratio was not more than *two shillings and six pence* to each individual.

For France the ratio was scarcely *six pence* to each individual.

The figures 1, 5, and 217, will therefore nearly represent the relative proportions; i. e., Great Britain and Ireland, *comparatively to population*, having 217 times as large a life business as France, and 43 times as large a business as Germany.

In order to ascertain whether the business of life insurance in the United Kingdom is of such small proportions as to confirm the conclusion of the Report, that "the ground hitherto occupied is comparatively limited," let the various bearings of the circumstance of a sum insured amounting in the aggregate to say one hundred and fifty millions (and which is believed to be not far from the truth) be first considered. This amount of life insurance requires payment by the assured of about £4,500,000 of premium annually. This can scarcely be called a limited field of operation, when, comparing it with the whole receipts for property and income tax under the three schedules in 1853, it is found to be but a little more than one million short of the collection for that tax.

We will revert to the consideration of the question in a financial sense, when we have examined it a little further in a statistical point of view.

In estimates of such a kind, only probable statistics can be employed; but criticism will have no right to complain so long as the figures quoted in support of any argument are stated at a minimum, rather than at the maximum which would give the argument greater force.

It has been before stated that there are 200 Life Insurance Offices in activity, and 50 more which will probably be established

before any fresh legislation on insurance is likely to take place. These 250 Companies will, on the average, have about 100 agents each: total, 25,000 agents. The same Companies will, on the average, have about 100 persons attached to each of them, either in the shape of directors, officials, professional men, solicitors, brokers, members of mutual Societies acting as agents, &c. This makes up another 25,000, and gives a grand total of 50,000 individuals acting as agents.

Next let us consider what field of operation each particular item of this agency numerically possesses. It will suffice to consider what is the proportion which the 50,000 agencies bear to the proportion of insurable male lives in the United Kingdom. The ages between 15 and 70 are all that come within the scope of such an inquiry. The male population of Great Britain and Ireland, at all ages, as per census of 1851, was 12,254,163. To arrive at the proportionate population at ages between the ages of 15 and 70, if we take the indications of a general life table as a sufficiently near approximation for the whole kingdom, we get 5,400,000 as the aggregate number living at such ages.\* Only a few people out of the number who belong to the Friendly Societies can also afford to effect policies with Life Insurance Companies. There are said to have been between twenty and thirty thousand Friendly Societies in existence in 1851. We must therefore deduct at least one million for the number of male members between the ages of 15 and 70. This reduces the field for the Insurance Companies to about 4,400,000 souls (male lives); from which deducting, say 400,000 for the lives already insured in Insurance Companies, we have 4,000,000 left as the aggregate net number, or 80 individuals only to each of the 50,000 insurance agents. Eighty persons being thus the average field for the exertions of each agent, let it be recollected that this small number among which insurances are to be sought includes all those who are in the extremes and means of poverty and affluence—of hard destroying labour, and of complete immunity from toil—of robust health, and *in articulo mortis*. Then let it be considered what various reasons and shades of reasons render life insurance often impracticable or unresorted to—such, for instance, as the case of the sick, whose lives cannot be insured; the poor, who have no means to insure with; the rich, who have sometimes

\* In confining the preceding estimate to male lives, it may be observed that the proportion of insurances on female lives is always a small branch of business, and confined to such narrow limits as not to add much to the numerical estimate as to the field for insurance.

neither cause nor wish to insure; the careless and improvident, who will not insure when they ought to do so, &c., &c.

After careful reflection on these points, the reader will perhaps fully admit that there is a vast deduction to be made, from the small extent of the field shown to exist for insurance, comparatively to the number of already existing Offices, to the number of agents, and to the number of persons already interested in practically furthering the extension of the business. These facts would appear to so completely establish that the Select Parliamentary Committee of 1853 have mistakenly come to the conclusion as to there being a wide field open for the spread of life insurance, that it is scarcely requisite to show that, were it otherwise and the field larger, the number of Companies would still require to be kept concentrated, so that the business of insurance might not be so infinitesimally divided as at length to belie its very principle of being the association of large numbers, calculated thereby to prevent the extreme fluctuations of chance pervading small numbers exposed to a law of average, which, uncertain in a small surface of risks, becomes relatively certain and assured when working on a large mass of cases in which that law can obtain its needful development.

"But," some will observe, "the population is increasing rapidly; the field for life insurance is also widely enlarging." Is this so certain? Is it not the recorded fact, that emigration for the last few years has removed nearly one thousand persons *per day* from this country, and has included in that number a large proportion of hale insurable lives? With the involvements of the state of war into which we are now thrown, who is to estimate what drain may take place upon our adult male population, to supply the army and navy and the greatly increased demands which battle and disease will bring with them in foreign service? The population of the second metropolis in Europe decreased by no less than 3 per cent. in the quinquennial period 1846 to 1851; and similar checks and diminutions of our own adult population, may, as in the case of the general population of Ireland in the decennial period 1841 to 1851, also take place. The dearness of the necessaries of life will not render insurance more resorted to, nor more profitable, and the observation of the Select Committee as to the extension of insurance to the "humbler classes" will on this score be the more difficult of realization; besides which, these classes generally prefer resort to Friendly Societies, as being more appropriate to their wants, these being rather in the direction of succour for them-

selves in sickness, want of work, and old age, than in that of making a provision for their heirs, by small life insurances, which, unless effected in some privileged Offices, become, when a claim arises, liable to probate duty or to the nearly as large expenses of administration. Independent of this, it is a very doubtful question whether it would repay Insurance Companies to grant large numbers of policies upon the lives of the humbler classes, if in that designation are to be included lives employed in extremely unhealthy and hazardous occupations, living in unhealthy cellars and in low localities, rife with fever and with the various influences inimical to life which have been so vividly portrayed in the Reports of the General Board of Health.

We have now finally to pass to a few financial considerations. Let the total number of Offices to be taken as the basis of an approximate estimate be, as before, 250. If these Offices are collectively to carry on a range of business about equal to the present sum insured, *i. e.*, one hundred and fifty millions, the average sum insured would be only £600,000 to each Office. This would represent an annual receipt from premium of £18,000, on the average. But current expenses of management, irrespective of preliminary expenses and agents' commissions, would, as also before explained, be at the very least £3,000 per annum, or nearly 17 per cent. of the £18,000 for each Company. An extract has before been given\* from an article in this *Magazine*, which inculcated the great desirability of such expenses not amounting to more than 10 per cent. on premiums. To bring about such a result, the average sum insured in each of 250 Offices should be £1,000,000; the corresponding annual premium would then be about £30,000, and the expenses referred to just 10 per cent. This would be possibly obtainable by the aggregate gross sum insured augmenting from 150 millions to 250 millions, and the annual premiums receivable, from 4½ millions to 7½ millions. Different opinions may exist as to the number of years required to lead to an additional one hundred millions in the sum insured, and an additional three millions in the annual future receipt from premiums; but sufficient reasons have been adduced to show what obstacles are in the way of such a result being arrived at in life insurance business for many years to come. There are a great many other circumstances which corroborate the latter view, and these are well known to those who have a practical and large acquaintance with the details of the business, but need not be more particularly referred to in an article of a general character like the present.

\* Vide page 329, *ante*.

Let it however be assumed, for the moment, that the before-mentioned amount of increase may probably be attained in a short number of years. Even then, such a result could not be obtained in so beneficial a manner to the public by the creation of more new Companies, as by the increased amount of business being transacted by already existing Offices. By the word 'public' is here meant not only the insuring public, but also the insurers, the existing Offices, whose interests and the various ramifications of their influence belong so largely to the public, and have so large and long-standing a claim upon public support. Practical experience is showing that there is a reaction even now beginning to take place from those halcyon views as to the possibility of the almost indefinite multiplication of Offices, which views were so much encouraged by the Act of 1844, and by some peculiar anticipations as to the rate of interest and progress of things commercial and political, which have since not been realized.

Admit, however, for the moment, that one hundred fresh Life Offices should be started, whilst (by slow degrees, it would be found) the sums insured were growing up to an extra one hundred millions, and the premiums to an extra annual receipt of three millions, above the figures at which they may now respectively be taken. Under these circumstances, and keeping in view the limitations which have been before explained as belonging to the subject, it would be difficult to maintain that the public would be the gainers. One hundred new Companies would soon cost an additional £300,000 per annum of ordinary current expenses, exclusive of preliminary and agency expenses. The competition of the new Companies, within so restricted a field as has been shown to exist, would render a larger proportionate outlay necessary on the part of already existing Companies. Take the additional charge at only £500 per annum for each, and this would amount to £125,000 per annum for 250 Companies; so that the annual increased charge for subdividing a proportionately small amount of increasing business amongst 350 instead of 250 Companies may be estimated to entail an almost entirely unprofitable charge on the public of £425,000 per annum—viz., £300,000 for the 100 new Companies, and £125,000 for the increased expenses of 250 existing Companies. The effect, assuming the total business of life insurance to increase to the sum of 250 millions sterling, would be as follows—with 250 Companies, the ratio of expenses, as explained, could be reduced to about 10 per cent.; whilst with 350 Companies in existence it would probably amount in the aggregate to 15½ per cent., or £1,175,000 out of £7,500,000 of annual

premiums. This is one view of the case, when we allow for the possibility, within a reasonably short number of years, of the increase of the business to its above assumed proportions; but take the other view, in which it may be assumed that, for various sufficient reasons, the sum insured will not for a considerable number of years exceed its present amount of, say, one hundred and fifty millions insured, producing four and a half millions of annual premium. Here it is quite possible that expenses should still remain as high as the figures above quoted for the joint action of 350 Companies. The results would then be, that instead of the ratio of expenses amounting to  $16\frac{2}{3}$  per cent. with 250 Companies, they would, with 350 Companies, amount to 26 per cent., viz., to £1,175,000, instead of £750,000 out of £4,500,000 of annual premium.

Thus, in either event, the expense to the public would be heavily increased, without corresponding benefit, to say nothing of the further expense for *capital*, if such be really a charge, for many who zealously protest that it is so, would have no objection to the increase—(although without sufficient field of operation)—of one hundred or any greater number of new Companies without any capital, or with capital of a merely nominal small amount; notwithstanding the annual charge for current expenses would cost the public more than six times the annual charge which the possession of a permanent guaranteeing capital of fifty thousand pounds for each Company might, by some, be considered as entailing, although its possession may, more fairly, be considered to afford such substantial advantages as to be deserving of the character of a benefit, and not in any respect of a burden, to either insurers or insured.

In concluding this article, it is necessary for me to observe that, long as it is, it does not profess to enter into all the arguments which the subject admits of. All that has been attempted is, to convey, however inadequately and imperfectly, something of the convictions of the writer upon points, regarding which, it is the duty of all who are interested in the progress of insurance to contribute such observations as they may consider called for under its present circumstances, viewing them in a manner apart from the spirit of mere controversy, and with the sole wish of aiding a practical consideration of subjects which have their peculiar difficulties, and which it is therefore the more important should be decided on by legislative measures generally satisfactory to the important interests involved.

APPENDIX, No. 1.\*

SKETCH OF THE EARLY HISTORY OF LIFE INSURANCE IN FRANCE, WITH  
TRANSLATION OF THE "ARRET DU ROI LOUIS XVI." PREFIXED.

*Decree of the King's Council of State, of the 3rd November, 1787, authorizing in perpetuity the Institution for Assurances upon Life, with an exclusive privilege for fifteen years :—*

"THE KING, having had a report made to him as to the nature and principles of different establishments founded in Europe, under the name of *Assurances upon Life*, has observed that they possess valuable advantages; that if naturalized in France, they would be of great utility; that a considerable number of individuals of both sexes and of all ages would find therein a facility for insuring upon their lives, or for terms of their lives, rents or capital sums, either for themselves during old age, or, after them, in favour of the survivors to whom they would wish to leave resources or benefactions; that these descriptions of insurances, if fixed at a moderate and equitably arbitrated rate, would release from the usury which is too common the sale of every kind of capital and of annuity, or would extend enjoyment of them to survivors; that, finally, these various combinations, usefully binding the present to the future, would reanimate those feelings of affection and of reciprocal interest which make the happiness of society and augment its strength. These united considerations have convinced his Majesty of the usefulness of an Establishment for Assurances upon Life, and have decided him not to defer it any longer. But the more the advantages of it have appeared precious, the more it has seemed important to his Majesty to make those advantages secure. His Majesty might have abandoned the matter to the different Companies which have presented themselves; but under existing circumstances, he would have feared, by multiplying the Companies, to open a new course to a false and pernicious business which it is needful to repress.

"His Majesty has, moreover, been informed that competition became *hurtful* to this kind of institution, in those countries where they were exposed to it at their foundation: their success, in fact, cannot be more efficaciously assured than by the prompt uniting of a multitude of chances; and, although these insurances should be calculated so as to derive their complete security from the union of chances, the King has thought it useful to submit those who will be charged with the conduct of this Establishment to a considerable financial engagement, in which each of the insured will have an authentic guarantee of the contracts entered into with him. Neither has his Majesty deemed that the utility to his finances, which he might derive, at present and in future, from this Establishment, should be neglected. Finally, in order to conciliate all interests with the precautions which may establish confidence, he has judged it to be expedient to confide to a public and enlightened administration, like that of his good city of Paris, the *surveillance* of this establishment, and to authorize it to concede, in the name of his Majesty, the exercise of this privilege to the Company for Insurances against Fire, established by decree of the Sixth November last, which Company has already presented its submission in that respect, and to which alone his Majesty purposes granting, during fifteen years, the exercise of the said privilege. This *surveillance*, whilst it will preserve to individual interest the activity which is necessary to it, will leave nothing to be feared on the score of any doubtful, reprehensible, or hazardous speculation; and the known zeal of the administrators of the city of Paris for all that interests the good of the State and the service of his Majesty will be further stimulated by his Majesty's disposition to apply the profit resulting from the said Establishment to the particular expenses of the city of Paris, which were or should be borne by the Royal Treasury.

\*(*Vide ante*, page 312.)

"Wishing to provide for which—having seen the said submission, signed DE GESMES—having seen the requisition of the Procurator of the King and City, and the official deliberation dated twenty-fifth October last—having heard the report of the *Sieur* LAMBERT, Councillor of State and Ordinary to the Royal Council of Finances and Commerce, Comptroller General of the Finances; the King, in Council, has ordered and orders as follows:—

(The thirteen conditions of the concession are then given. A summary of their contents will suffice.)

"1. The concession was to be perpetual, but not exclusive, except for the first fifteen years.

"2. The town of Paris to have perpetual right of inspection, and the King to be represented at boards, &c. by a Special Commissioner.

"3. The capital to be eight millions of livres, in addition to the eight millions raised as the capital of the fire insurance branch.

"4. The sixteen millions were to be paid in at the Hotel de Ville—four millions to be invested in '*effets royaux*,' to be chosen by the Company, and the remaining twelve millions in acknowledgments of the Royal Treasury. Interest upon the latter to be paid to the Company every six months, at the rate of five per cent.

"5. The sixteen millions to remain in deposit in an iron chest at the Hotel de Ville, shut with three different keys; one key to remain there, the second in the hands of the cashier of the Company, and the third in the hands of one of the managers.

"6. Eight millions out of the sixteen to form the fire insurance guarantee, and the remaining eight millions to remain the guarantee of the life assurances, until perfect fulfilment of the engagements entered into by the Company.

"7. In case of the Company being obliged to have recourse to its capital, it is bound to replace all the money taken from it within a month at latest, and by call or otherwise; the intention being that the capital should be permanent, and that the Company should, when called upon, prove it to the appointed Commissioner.

"8. The prospectus, policy forms, calculations, &c., to be approved by the King.

"9. The bye-laws and rules for administration to be similarly approved.

"10. A net fourth of the profits to be ceded to the town of Paris.

"11. Foreigners to be allowed to insure without payment of the *droit d'aubaine*.

"12. Style of the Company, and right to have a common seal.

"13. The *Prevôt des Marchands et Echevins* of Paris to take cognizance of all the suits arising out of the business of the Company, to the exclusion of all courts and judges, save appeal to the Council."

On the faith of the above concession the *Compagnie Royale d'Assurances sur la Vie* was about to commence its business operations, when a competitor arose to attack its privileges. Feuchere, Lafarge, and others, had been instrumental in creating a "*Chambre d'accumulation de Capitaux et d'Intérêts composés*," which the King authorized by *Arrêt* of the 5th April, 1788. The respective interpellations and replies of those interested in the respective Companies were submitted to the Council of State. At their sitting at Versailles, 27 July, 1788, an *Arrêt* was signed, explaining that the *Compagnie Royale* was intended to have the exclusive monopoly for fifteen years of all insurances for fixed sums or annuities deferred on survivorship, but that this was not to apply to accumulation or



other projects of the kind contemplated by the *Chambre d'Accumulation*, nor to the grant of immediate annuities, for which branches the privilege was not to be exclusive. On the other hand, Feuchere and all others were expressly forbidden from entering into contracts which concerned insurance business.

On the same day another royal *Arrêt* appeared, separating the fire and life insurance branches of the Company in respect of the capital and business, but leaving each under the representation of *De Gesmes*.

Material alterations were also made as to the investment of the greater portion of the capital of sixteen millions which had to be raised, and of which it appears that one half had already been lodged at the Hotel de Ville. Twelve millions of *livres*, which under Condition 4 of the first concession, before recited, were to be invested in obligations of the Royal Treasury at five per cent. interest, were, instead of this, to be reimbursed by the State, by the grant of life annuities at ten per cent. on the capital, upon the lives of such nominees as the Company might choose.\*

The Company, in a supplement to its prospectus, includes some observations which would make it appear that they were not, on the whole, dissatisfied with this arrangement as an indemnification for the injury they had suffered from delay. The prospectus extends far beyond the usual limits of such documents, and comprises 112 quarto pages, exclusive of supplementary additions. Notwithstanding its length, it is a very readable and instructive production—is written with considerable talent, and the examples it gives of the various applications of which insurance is capable, are well chosen and expressed. The progress of England in the science of insurance is specially referred to—its experience appealed to, and its principles approved. In fact, the tables, conditions, and principles of the *Compagnie Royale* were avowedly derived from English sources. The rates of premium were from 5 to 10 per cent. higher than those originally required by the *Equitable Society*. Some hearty encomiums are passed upon Dr. Price: for example—

\* How much of the capital was finally paid up and invested cannot easily be traced. The Company and the State may both have made profits from confiscation of shares on which instalments were not paid up. In my copy of the *Arrêt* of 27 July, 1788, there is a manuscript extract from the *Journal de Paris du Vendredi, 8 Août, 1788*, which runs thus:—"Compagnie Royale d'Assurances sur Vie. Jugement de M.M. les Prévôts des Marchands et Echevins de la ville de Paris, qui homologue deux délibérations de la Compagnie Royale d'Assurances sur la Vie, et ordonne la vente des reconnaissances de portions d'intérêts des actionnaires et souscripteurs qui seront en retard des paiemens de l'appel et de la souscription, et n'y auront pas satisfait au 15 de ce mois pour tout délai."

"Ce citoyen respectable, auquel on doit d'avoir mis au grand jour la doctrine des assurances sur vie, n'avoit d'autre intérêt à éclairer les Sociétés qui entreprenoient ces assurances, que son amour du bien public. Il leur conseille de calculer attentivement leurs primes, de ne pas craindre de les établir sur un pied qui leur soit avantageux; en un mot, il leur recommande de la manière la plus forte, de ne point compromettre leur succès; et de modifier toujours le calcul exact des mathématiques par celui de la prudence.

"Les observations du Docteur Price ont guidé la Compagnie. Elle s'est convaincue que si, en Angleterre, les vrais calculs, sur lesquels reposent la solidité des assurances, ont enfin prévalu, ce n'est cependant qu'après un combat de rivalité, qui a long-temps retardé l'utilité des assurances, et fait un grand nombre de victimes."

If we do not go so far as to characterize the prospectus, as, in the words of a French writer of much discrimination, "*une pièce d'une extrême valeur historique*," it should at least have honourable notice in any bibliography of insurance.

The *Compagnie Royale* was soon doomed to annihilation. As to the extent of the business it transacted there are conflicting statements—some to the effect that little was done, others that the five years' existence of this establishment "lui suffirent pour faire des affaires brillantes."

*De Gesmes* had fixed his rates of premium at rather a high rate. He was justified however in doing so, inasmuch as the mortality amongst insured lives was yet an experiment to be tried, and he had reason to believe that the results would not be so favourable as in England.

These tables of premiums were written down, certainly with more of party spirit than of justice; obloquy was heaped on *De Gesmes* and the other projectors of the scheme, as sordid speculators, who had got up the Company with no intention beyond that of enriching themselves at the bursting of the alleged bubble. But was it really so? The proofs are wanting; and until they are made plain, we should hesitate in coinciding with the impression which may be gathered from some authors, as to *De Gesmes*, the promoter and manager of the two Companies,\* being deserving of enduring stigma and disgrace. Until facts to the contrary are before us, it is just an open question whether *De Gesmes* was either more or less than one of the innocent victims of a revolutionary period. The Companies he projected, and himself and his fellow managers, were soon publicly arraigned by so redoubtable an adversary as *Mirabeau*, who poured against them all the fervid torrent of his rhetoric, in the long pamphlet

\* The concessions for both Companies were granted to *De Gesmes*. The name of *M. E. Claviere* appears at the end of the prospectus of the Life Company as the *Administrateur Gérant*.

entitled "*Suite de la Dénonciation de l'Agiotage*."\* In the *Memoires de Mirabeau* it is stated:—

"L'objet apparent de cette brochure est de signaler de nouveau les manœuvres de plus en plus actives des agioteurs, qui portent à des prix entièrement fictifs les actions d'une multitude d'Etablissements dont les principes sont imaginaires ou illégaux, et dont le monopole est ruineux pour les industries loyaux. L'auteur s'attache surtout à la *Compagnie d'Assurance sur la Vie*, et défend contre elle la *Chambre d'Accumulation* qui n'émet pas d'actions, qui ne demande pas des privilèges, qui se borne à offrir les moyens de convertir en capitaux les prestations pécuniaires les plus minimes, avec l'*accumulation* progressive et constante qui résulte de l'action des intérêts composés.

"Il se récrie encore une fois contre les *privilèges exclusifs*, injuste dans leurs causes, abusifs dans leurs vues, funestes dans leurs effets," and so on.

The Count de Mirabeau's eloquence was not on this occasion either that of the Tribune or of the disinterested pleader.† He wished to inculcate the mutual advantages of the *Chambre d'Accumulation*, &c., which was afterwards established, though the Constituent Assembly of 1791 refused its approbation, under the title of the *Caisse d'Epargne et de Bienfaisance*. Originally, that is shortly after the projection of the *Compagnie Royale* in 1787, it would appear that its intended title was the *Tontine Viagère et d'Amortissement*. When it came before the *Constituante*, Lafarge, under the protection of *Mirabeau*, had incorporated with the scheme of *Feucheres*, (the royal *Arrêt* concerning which, has been before referred to,) a much more extensive Tontine survivorship plan, and which was puffed as combining the advantages of savings' banks and mutual insurance.

The scheme at length got the derisive name of the *Tontine des Immortels*, and turned out to be one of the most barefaced delusions ever palmed on the public. Large in all its professions, promising enormous and impossible benefits, it made a parade of its accounts, and had the singular audacity to publish that its calculations were approved by the Academy of Sciences, although that illustrious body had formally declared them to be wrong. Notwithstanding all this, the scheme took vastly with the public. The self consumption which was in the very germ of the Society's plan had not time to develop itself before the ruin of the national finances ensued,

\* This appeared in 8vo., 1788, pp. 80, with the epigraph of "*De salute publici nil desperandum*."

† "Enfin, il était sollicité vivement par Pinchaud, dont les intérêts étaient fortement engagés dans ceux de la *Chambre d'Accumulation* (*Mem. de Mirabeau*, Vol. V.). And, referring to the subsequent defence of the *Chambre d'Accumulation*, at the sitting of the Constituent Assembly of 3 March, 1791, *Dr. Gouraud* observes, "*Mirabeau eut le triste courage de mettre sous la protection de son éloquence le désastreux projet.*"

and the *Caisse Lafarge* (as the Association is generally termed) shared in their fate; and it does not appear from history what proportion, if any, of the 66 millions of francs belonging to the depositors in this *Caisse*, ever got back to those unfortunate individuals.

It is generally considered, that the remembrance of the distress and distrust occasioned by the failure of the plans of the two Societies whose histories are sketched in the preceding remarks has been, down to the most recent times, a prominent cause of the want of success of life insurance in France, inasmuch as all calculations depending on life insurance or survivorship contingencies were invariably, at the commencement of this century and to a very considerable extent until the most recent period, indiscriminately supposed to be fraught with the same errors as the absurd professions of the *Tontine Lafarge*, or liable to lead to as unsatisfactory results as was the lot of the *Compagnie Royale* of 1787 to 1791, notwithstanding the mishaps of the latter were not those arising from the rates of premium or calculations, but were only owing to fortuitous circumstances.

It is only since 1819 that a new Life Insurance Company was started in France; and now, after the lapse of 35 more years, there are but five existing Life Insurance Companies;—I refer here to what are called "*Sociétés anonymes assurant à primes fixes*." These are the *Générale*, *Nationale*, *Union*, *Phénix*, and *Caisse Paternelle*. Only a short time ago there were six other Companies—the *Urbaine*, *France*, *Providence*, *Soleil*, *Aigle*, and *Méluise*; but all these, according to a statement published but a few months since, have given up the business of life insurance, and have voluntarily put their affairs into liquidation. "*Ainsi donc la France*," says M. Claude Merger, "*avec ses trente-cinq millions d'habitans, n'a que cinq Compagnies d'Assurances, pendant que l'Angleterre en a plus de deux cents, qui toutes font un chiffre énorme d'affaires!*"

The whole amount of the sums payable at death of persons insured by the French Life Insurance Companies probably does not amount to one million pounds sterling, and the largest number of policies are for short period risks, or renewable only for a very limited term. There are, it is true, policies amounting to nearly 20 million pounds sterling insured by the *Associations Tontinières* for deferred annuities and endowments payable in lifetime; and according to the official Government returns for 31 December, 1853, there was a total sum received, up to that date, of about £7,430,000, and about £338,000 of *Rentes sur l'Etat* had been

purchased since the establishment of these Associations, which are, however, merely "investment or Tontine clubs,"—and life insurance, as understood and applied by us in England, has scarcely any existence in France. There were always prejudices in that country against life insurance. These originated in the hyper-orthodox dogmas of the older jurists, some of which have already been referred to in my former paper,—(inserted in this *Magazine*,)—on the Early History of Insurance. The effect of these adverse notions appears never to have been effectually removed; and whilst fire insurance is at present resorted to in France to a greater extent than in any other country, it is still an enigma for her economists to solve, why no real progress worthy of mention has hitherto been made in life insurance; and although many reasons for this might be advanced, in addition to those which they have occasionally brought forward on this point, the conviction remains that none are entirely satisfactory in accounting for this anomaly.

## APPENDIX, No. II.\*

ON PERSONAL AND UNLIMITED RESPONSIBILITY. BY SIR F. M. EDEM, BART.,  
FIRST CHAIRMAN OF THE GLOBE INSURANCE COMPANY.

THE principles of political economy are so well understood in this country, that, in applications to Parliament on subjects of commerce, the parties may reasonably expect that a very general attention will be paid to remedy by new laws the inconveniences which may be proved to have arisen from existing regulations. Indeed the welfare of society requires that the disposition to improve should be combined with the disposition to preserve; and a well constituted legislature will, whilst it pays a due reverence to the stored wisdom of antiquity, ever endeavour in its enactments to accompany the progress of civilization. The old English adage, *nolumus leges mutari*, in its literal meaning, unexplained by circumstances, must be deemed only to be a relic of pure barbarism: considered as the emphatic declaration of "barons bold," determined to resist monarchical encroachments on their feudal rights, it may impress us with a high opinion of the sturdy inflexibility of our forefathers; but it can only be held to be practicably admirable, in being limited to signify a resolution of strenuously resisting all innovations on such constitutional principles and constitutional laws as are essential to freedom. In matters of trade, the "form and pressure" of the time must be consulted; and in this country we fortunately possess a legislature peculiarly well adapted, from the diversified interests of the individuals composing it, to correct the impediments which the defective codes of ancient times may now present to the various complex operations of increasing wealth and extended commerce. Nor does it derogate from this most important function of Parliament to admit that human industry will, in almost every possible sphere of its exertion, thrive best uncontrolled by laws which shall prescribe its course and direction. Such interference, it may be admitted, is unnecessary; yet still, as property itself is the creature of law, it is indispensable that the various rights of property claimed and exercised in a state of society should be clearly regulated and defined; and among them the

\* (Vide page 322, ante.)

title to property by contract is not the least important. Trade must be regulated by law, because it cannot be carried on without the sanction of legal penalties to enforce the fulfilment of those obligations which are entered into by individuals in their dealings with each other.

Of these penalties, the principal is personal responsibility, which may well be called the *Magna Charta* of sellers. This responsibility—which everyone engaged in trade is under—to make good his contracts at the risk of his fortune and even at the risk of personal liberty, is necessary to enable individuals and partnerships to obtain that credit without which commercial dealings would be too circumscribed to provide for the wants of mankind. If it were requisite that a merchant, in order to carry on business, should pay ready money, pawn goods, or mortgage land, for all the articles he wished to purchase, his capital ought to be equal to his outstanding speculations. It is, however, well known that the risks of a fair trader may, in common prudence, extend beyond this limit. The merchant of Britain may, as well as the merchant of Venice, Antonio, be “sufficient, though his means are in supposition”; and he may, in various cases, be fully justified, on commercial principles, even in the eyes of those who are his creditors, if he reasons as the same Antonio permits his friend Bassanio to do :

“In my school days, when I had lost one shaft,  
I shot his fellow of the selfsame flight  
The selfsame way, with more advised watch,  
To find the other, forth ; by vent’ring both,  
I oft found both.”

In dealings thus carried on, the credit that is given by one party is necessarily associated with and protected by the personal responsibility of the other. But the foundation of such credit is an adequate knowledge of the circumstances of the person to whom credit is given. Those who accept personal responsibility as their guarantee, ought to possess satisfactory information respecting the integrity, the abilities, and the property of those who contract with them. It however very frequently happens that, notwithstanding the various opportunities which occur in the commercial world of studying the state of a trader, confidence in his moral character is misplaced, the talents which he possesses are overrated, and the opulence ascribed to him exists only in the imagination of his creditors. The knowledge, however, of all these points is a necessary branch of the business of everyone who expects to prosper in trade; and it is, to a considerable extent, attainable with respect to single traders and partnerships composed (as they usually are) of a few individuals. In the ordinary course of trade, the credit given by the seller is either given by one trader to another, whom he has the means of knowing, or to a consumer, whose habits of life and situation are even less susceptible of disguise than the condition of a merchant. But in dealings with a numerous body of insurers, credit is given by the buyer; and the various classes of society who are interested in preserving their property by insurance, cannot be supposed to possess the means of appreciating the solvency of the different partners. Though in effecting an insurance they give, in fact, credit to the insurer, they seldom look beyond the premium required, and the names, or at most the character, rank, and substance of the managers, and affix little value to the general liability of property which is not exclusively pledged to them and to the personal responsibility of individuals with whose names they are unacquainted.

There is another material difference between insurance and other commercial adventures. The general dealings of traders do not often extend beyond very limited periods; they are usually of a nature to be adjusted and wound up within a few months, or, at farthest, within a very few years. Peculiar circumstances indeed occur in every branch of commerce to interfere with the general system, but these peculiar circumstances form the exception, and not the rule. Credit is rarely intended to be given to a distant period; and personal responsibility, from its very nature, is ill calculated to provide for remote contingencies. Such objects are seldom attempted to be secured on the personal

responsibility of individual traders, but are usually effected by the investment of disposable funds (as in the case of marriage and other family settlements), or by dealings with public bodies or long established partnerships. The unfitness of personal responsibility to guarantee contracts of life insurance on events, which may in many instances remain undetermined during the life of the responsible party, has in all probability occasioned the whole, or nearly the whole, of this business to be transferred from individual to associated insurers. In marine insurance, the risk in most instances being of a nature to be determined within a period that is short when compared with the ordinary term of human existence, personal responsibility, however inadequate it may prove in particular cases, is not objectionable on the particular ground of inapplicability to provide for distant hazards. But it may be said that although distant hazards cannot be adequately provided for by individual insurers, they may by associated individuals, whose numbers confer perpetuity on the partnership. It is undoubtedly true that, in thus attempting to acquire the principal attribute of a corporation, a private partnership can conveniently enter into speculations of uncertain and probably long duration; but it will be seen, from noticing two principal qualities which a joint stock fund may possess, and which must be wanting in a personal responsibility fund, that in the business of insurance stronger probabilities of security are afforded by the former than by the latter (only probabilities, indeed, by either): for certainty is not compatible with trade; and in insurance, as in all other dealings, the doctrine of chances, founded on reasonable probabilities, must operate.

1. *The joint stock fund is susceptible of regulations, by which its amount may be periodically ascertained and made known, not only to its proprietors, but to its customers.* Its accounts can be subjected to an undisguised publicity. On the contrary, the amount of a personal responsibility fund never can be known. *Omne ignotum pro magnifico* seems to be the principle on which it asserts a claim to confidence. It will appear greater or less to its customers according to their extent of information respecting the property, talents, and character of the persons constituting the partnership. Insurance Societies, indeed, may, as easily as corporations, ascertain the value of their outstanding risks by periodical investigations; they may publish an annual account (though it is believed no Office in Great Britain does so) of their receipts and payments; but, unless they were enabled to annex to such account a correct statement of the particular dealings, outstanding risks, debts, credits; and stocks of the individuals concerned in the Society, the account of their personal responsibility fund would be incomplete.

2. *The joint stock fund of an Insurance Corporation is peculiarly answerable for their contracts; it is exclusively appropriated to their use, and cannot be affected by the private dealings of the individuals composing the body corporate.* Quite the reverse is the case with partnership Societies. Their accumulated funds, current receipts, and credits, are answerable for their individual contracts. The personal responsibility under which the members exercise their particular dealings, and which they carry into the society as its fairest feature, upon the same principle that it gives the customers of the Society an interest in a fund that is pledged to the customers of the individual, gives the latter a title to it likewise.

The unchartered Offices have contended, with a natural *esprit du corps*, that the personal responsibility of the proprietors of an Insurance Office is a better security for the performance of its engagements than a capital actually raised and vested in real or Government securities. It may be answered that personal responsibility is the capital of pennyless adventurers. On this fund a long list of individual insurers, in ephemeral succession, without either skill, character, or capital, has been consigned to bankruptcy. On this fund many unchartered Offices were opened during the last century, and failed. The proprietors of some of the partnership Societies, it is possible, may collectively possess a capital of several millions, but it may be disposed of by the reverses of the individual proprietors in trade, and in various other ways, before the risks insured against

accrue. The public, therefore, is not completely secured by the unlimited responsibility of private property :

—“Puncto quod mobilis horæ,  
Nunc prece, nunc pretio, nunc vi, nunc sorte supremâ,  
Permutet dominos, et cedat in altera jura.”\*

Personal responsibility in trade is well adapted to a state of society in which traffic can be carried on by individuals or partnerships composed of a few individuals; but in the extended operations of mercantile adventure, which are the natural consequence of national improvement, new modes of forming contracts become necessary. For purposes which require a very great capital, and which consequently cannot easily be transacted by individuals, the legislative principle of representation is introduced into trade, and the interests of the various persons concerned are placed under the management of trustees. In such cases, no doubt, all the parties who profit by the dealings are responsible for the losses of the firm; and if those parties can be discovered, they are amenable, both in purse and in person, on their trustees proving insolvent. But if, as has already been observed, the principle of personal responsibility presupposes the inquiry, or at least the power of making inquiry, into the means of those to whom credit is given, it certainly cannot be said that a person, dealing with traders who are trustees for others unknown to him, is much influenced in his dealings with them by those unknown persons being personally responsible. Far more convenient is it that a known fund should be substituted for unknown responsibility, when the firm, on whose responsibility the customer is to rest, becomes very numerous; and that a large association should not be deterred from entering into trade from the inconvenience they would experience, under the common law, in attempting to enforce their contracts. Sensible of the reasonableness of alteration in this respect, the legislature of Ireland, by an Act passed in 1782, commonly called the Sleeping Partner Act, authorized persons vesting a certain capital in a partnership fund to exonerate themselves from further responsibility; and empowered partnerships, however numerous, complying with the provisions of this Act, to sue and be sued by a corporate name. The British legislature has not, indeed, gone to the extent of altering the old obligations attached to contracts by any general law, but in various important cases, respecting dealings proposed to be undertaken by a numerous body, royal or parliamentary authority has, by the creation of corporations, companies, or trusts, placed the administration of their concerns under the management of directors, commissioners, or trustees, and substituted a known fund (deemed adequate for the undertaking) in the room of unknown unlimited personal responsibility. Not only the Bank, India, and Hudson's Bay Companies, but the various road trusts, fisheries, canal, dock, and other trading Companies incorporated by Act of Parliament, are instances of the opinion of the legislature, that the establishment of joint stock funds in great trading concerns is beneficial to the public. The three first corporations above mentioned (the Bank, India Company, and Hudson's Bay Company), it is true, possess another character—a character, however, which is not essential to a corporate body. They are monopolies. But the question of policy and expediency, with respect to the creation of a joint stock Company, is not connected with the question of monopoly. That must rest on very different grounds than the general qualities of a joint stock fund, and can be justified only by the paramount utility of the business which is to be the object of the monopoly, and the improbability that a corporation without exclusive privileges will be equally useful. Monopolies (to confine the observation to extinct monopolies) have certainly been injurious to the public; and, as most of the accounts of ancient corporations are accounts of pernicious monopolies, superficial reasoners have inadvertently concluded that all joint stock Companies, even those that have no exclusive privileges (establishments comparatively of modern date), must be detrimental to the public in preventing that competition in trade

\* Horace.



which is essential for their interest, although the obvious effect of creating non-exclusive Companies, in addition to existing traders, is to add to the assortment of dealers which the public possesses, and consequently to increase their chances of benefit from competition. But if the ill effect of monopolies were a reason against establishing corporations, it would be a reason against tolerating partnerships, or even single traders; for the instances of individual monopolies\* are far more numerous than those of exclusive Companies. The annals of Elizabeth and of her successors, down to the Revolution, furnish abundant proof of the misapplication of the prerogative in favouring particular traders; and if the practice had been continued, England, the seat of riches, of arts, and commerce, would (as Mr. Hume remarks) have contained as little industry as Morocco.†

The question, therefore, of policy and expediency, is not affected by the history of monopoly; and upon this question Adam Smith, who certainly entertained no prejudices in favour of corporations, deserves to be attended to. He says that "The value of the risk, either from fire, or from loss by sea, or by capture" (and he might, with great truth, have added the risk of life insurance), "though it cannot, perhaps, be calculated very exactly, admits, however, of such a gross estimation as renders it in some degree reducible to strict order and method. The trade of insurance, therefore, may be carried on successfully by a joint stock Company without any exclusive privilege. To render such an establishment perfectly reasonable, with the circumstance of being reducible to strict rule and method, two other circumstances ought to concur. First, it ought to appear, with the clearest evidence, that the undertaking is of greater and more general utility than the greater part of common trades; and, secondly, that it requires a greater capital than can easily be collected into a private copartnery. If a moderate capital were sufficient, the great utility of the undertaking would not be a sufficient reason for establishing a joint stock Company, because in this case the demand for what was to produce would readily and easily be supplied by private adventurers. In the four trades above mentioned" (the banking trade, the trade of insurance, the trade of making and maintaining a navigable canal, and the similar trade of supplying a city with water), "both these circumstances occur. The trade of insurance," he adds, "gives great security to the fortunes of private people, and, by dividing among a great many that loss which would ruin an individual, makes it fall light and easy upon the whole society. In order to give this security, however, it is necessary that the insurers should have a very large capital. Before the establishment of the two joint stock Companies in London, a list, it is said, was laid before the Attorney General of one hundred and fifty private insurers who had failed in the course of a few years."‡

\* Authorized either directly by patents for exclusive trade, or indirectly by the dispensing power of the Crown, which was discovered to be a very efficient mode of enacting monopolies. When the statutes laid the manufacturer of any particular commodity under restrictions, the Sovereign, by exempting one person from the laws, gave him in effect the monopoly of that commodity.

† Reign of Elizabeth, c. 7.

‡ *Smith's Wealth of Nations* (5th Edition), iii. 146-148.

## FOREIGN INTELLIGENCE.

**AMERICA.—New York.—Balance Sheet of the Mutual Life Insurance Company of New York, February 1st, 1853.**

<i>Liabilities.</i>		£
Present ascertained value of all the amounts assured . . . . .		1,402,306
Present value of annuities payable . . . . .		2,580
Present value of the first dividend of 1848 . . . . .		36,949
Special reserve for extra climate and occupation risks . . . . .		10,606
Amount of claims remaining unpaid . . . . .		8,060
Prepaid premiums, due third dividend account . . . . .		315
Balance . . . . .		116,348
		<hr/>
		£1,577,164
<i>Resources.</i>		£
Present ascertained value of future premiums, payable under existing policies . . . . .		1,163,649
Present value of annuities receivable . . . . .		1,386
Cash invested in bonds and mortgages . . . . .		381,476
Cash on hand and in bank . . . . .		5,281
Loans on policies . . . . .		3,516
Due from agents for premiums due before February 1st, 1853, and not remitted . . . . .		4,074
Deferred semi-annual and quarterly payments on premiums of the year 1852, due after February 1st, 1853 . . . . .		13,546
Interest due, but unpaid . . . . .		18
Interest accrued, but not due . . . . .		4,218
		<hr/>
		£1,577,164

*Second Dividend Statement.*

33½ per cent. on £310,311, being so much of the premiums, at the table rates, received on existing <i>life</i> policies, since February 1st, 1848, as covers the risks to February 1st, 1853* . . . . .	£	103,437
33½ per cent. on £33,812, being so much of the premiums, at the table rates, received on existing <i>term</i> policies, since February 1st, 1848, and issued prior to February 1st, 1851, as covers the risks to February 1st, 1853 . . . . .		11,270
16½ per cent. on £3,382, being so much of the premiums, at the table rates, received on existing <i>term</i> policies, issued since February 1st, 1851, as is necessary to cover the risks to February 1st, 1853 . . . . .		564
Undivided surplus . . . . .		1,077
		<hr/>
		£116,348

**Statement of the Affairs of the Mutual Life Insurance Company of New York, for the five years ending 31st January, 1853.**

	£
Assets on the 1st February, 1848	112,794
Deduct losses by death advised of, but not paid, due agents for commissions, and balance of annuity fund	2,618
	<hr/>
	110,176
<i>Receipts since 1st February, 1848.</i>	
	£
Cash received for premiums	436,343
„ interest	67,343
	<hr/>
Carried forward	£503,686

\* This will give a corresponding addition to the policies of from 43 to 100 per cent., or a diminution of the future premiums of from 186-100 to 572-100 per cent. of the premiums, as above.

Brought forward . . . . .	£503,686	£.
Interest accrued on bonds and mortgages to February 1st, 1853, not yet due . . . . .	4,218	
Interest due on ditto not paid . . . . .	18	
Profits on sale of stocks of U. S., State, and Corporation of New York . . . . .	4,852	
Annuity account for balance . . . . .	1,516	
Suspense account, various items in course of settlement . . . . .	142	
Third dividend account, being premiums paid in advance . . . . .	315	
	<hr/>	514,746
		624,922

*Disbursements for five years.*

Losses by death, paid . . . . .	151,838
Policies surrendered, paid . . . . .	11,782
Dividends on policies terminated by death, paid . . . . .	4,877
Expenses: rent of offices, salaries, medical examinations, exchanges, State taxes, postages, advertising, &c. . . . .	26,335
Commissions paid agents . . . . .	17,960
	<hr/>
	212,792
	<hr/>
	£412,130

*Assets.*

Cash on hand and in bank . . . . .	£	5,281
Bonds and mortgages on real estate in the State of New York, principally in the cities of New York and Brooklyn, worth double the amount loaned . . . . .	381,476	
Interest accrued on ditto to 1st February, 1853 . . . . .	4,219	
Interest due on ditto, not paid . . . . .	18	
Loans on policies . . . . .	3,516	
Semi-annual and quarterly premiums on policies issued previous to 1st February, 1853, due subsequent thereto . . . . .	13,546	
Amount due from agents . . . . .	4,074	
	<hr/>	£412,130
		£
Accumulated fund, per statement . . . . .		412,130
Deduct losses, unpaid . . . . .	£8,060	
Deduct premiums belonging to third dividend account . . . . .	315	
	<hr/>	8,375

Net accumulated fund, February 1, 1853 . . . . £403,755

*Thus disposed of:—*

Reserved for reinsurance . . . . .	238,657
Reserved for extra climate risk . . . . .	10,606
Reserved for annuities . . . . .	1,195
Present value of first dividend . . . . .	36,949
Dividend as per statement . . . . .	115,271
Undivided surplus . . . . .	1,077
	<hr/>
	£403,755

*Modes of applying Dividends.*

The board of trustees of the Mutual Life Insurance Company of New York, having announced in their ninth annual report that those holding policies for the whole of life should have the option of applying the dividend of 1853, as well as that of 1848, either by adding the same to the policy, so as to increase the sum insured, payable at death, or to the permanent reduction of their future premiums, submit the following illustration and explanation of these two methods of appropriating their profits, in order that members may make a choice understandingly.

The dividend of  $33\frac{1}{3}$  per cent. declared this day, is estimated, on poli-

cies taken out before February 1, 1848, on the whole amount\* of premium (table rates) received by the Company during the preceding five-year period; and on those issued since that date, on so much of the premium paid as covers the risk up to February 1, 1853; and this dividend, as the holder shall determine, may be indorsed on his policy at its equivalent reversionary value, payable on the death of the life insured, or as an annuity, payable once a year, at the time the party's premium falls due,† thus operating precisely like a reduction of the premium to the same extent.

Example :—

No. of Policies.	Amount Assured.	Age of Life Assured in 1853	DIVIDEND OF 1848.			DIVIDEND OF 1853.		
			Amount of Premiums participating.	Reversionary value of dividend, payable at death.	Annual reduction of Prem.	Amount of Premiums participating.	Reversionary value of dividend, payable at death.	Annual reduction of Prem.
1,184	5,000	31	289-50	254-72	6-57	482-50	393-10	10-14
1,379	4,000	73	1,026-00	533-52	63-37	1,710-00	738-77	978 1
5,457	5,000	30	..	..	..	445-72	368-23	9-29
6,702	5,000	63	..	..	..	871-64	437-18	33-66

*The Mutual Life Insurance Company of New York.—Statement of the Affairs for the year ending 31st January, 1854.*

Net assets on hand, January 31st, 1853, per balance book . . . £ 408,012

*Receipts for the 11th year.*

For premiums and policies . . . . .	£ 114,545
„ interest . . . . .	26,423
„ special deposits and bills . . . . .	14,165
„ annuities . . . . .	113
„ interest accrued . . . . .	4,500
	<hr/> 159,746

*Disbursements.*

Expense account, including rent, salaries, medical examinations, &c. . . . .	7,014
Commissions . . . . .	4,806
Advertising . . . . .	767
Exchange . . . . .	218
Postage . . . . .	159
Foreign State and City taxes . . . . .	508
Claims by death . . . . .	31,212
Additions to same . . . . .	4,223
Surrendered policies . . . . .	3,907
Reduction of premiums . . . . .	280
Annuities paid and commissions commuted . . . . .	6,004
	<hr/> 59,006

Total amount of assets 1st February, 1854 . . . £508,660

\* On 7-year and other short policies, taken out since March 1st, 1851, the dividend will be estimated at only one half the rate declared on policies for the whole of life, in accordance with an amendment to the charter of that date. The holder of said short-term policy will not have the option above named, unless he should take out a new one for the whole of life.

† If the premium be payable semi-annually, the reduction will be allowed on the second half year's premium; if quarterly, on the third quarter's premium.

Invested as follows:—		£
Cash on hand and in bank . . . . .		6,309
Advance on policies . . . . .		5,969
Bond and mortgage account . . . . .		468,736
Bills receivable . . . . .		27
Due from agents . . . . .		7,019
Interest accrued . . . . .		4,500
Interest due and unpaid . . . . .		776
Deferred premium account . . . . .		15,124
		<u>£508,660</u>
		£
Amount at risk 1st February, 1853 . . . . .		3,511,227
„ issued in the 11th year . . . . .		735,949
		<u>4,247,176</u>
		£
Deduct—Forfeited . . . . .	112,340	
Cancelled . . . . .	59,800	
Surrendered . . . . .	54,370	
Expired . . . . .	54,630	
Dead . . . . .	33,850	
		<u>314,990</u>
Total at risk 1st February, 1854 . . . . .		<u>£3,932,186</u>
Number of policies running 1st February, 1853 . . . . .		6,773
„ issued in the 11th year . . . . .		1,256
		<u>8,029</u>
Deduct—Forfeited . . . . .	255	
Cancelled . . . . .	115	
Surrendered . . . . .	107	
Expired . . . . .	107	
Dead . . . . .	72	
		<u>656</u>
Total running 1st February, 1854 . . . . .		<u>7,373</u>
Of which, 6,274 are for life; 971 for 7 years; 29 for 1 year; 99 for irregular periods.		
Increase for the year in amount at risk . . . . .		£420,959
Increase for the year in policies . . . . .		600
„ in life policies . . . . .		626
„ irregular period policies . . . . .		39
Decrease in seven-year policies . . . . .		57
„ one year ditto . . . . .		8

*Comparative Statement of the Business of the Mutual Life Insurance Company of New York during the 10th and 11th years.*

	During 10th Year.	During 11th Year.
Number of policies issued . . . . .	1,061	1,256
„ „ lapsed . . . . .	776	656
Increase for the year . . . . .	285	600
Amount insured . . . . .	£593,427	£735,949
„ lapsed . . . . .	354,845	314,990
Increase for the year . . . . .	£238,582	£420,959

(S. B.)

GERMANY.—*Fire Insurance Companies*.—The following summary of the operations of the proprietary German Fire Insurance Companies for the years 1852 and 1853 is taken from the April number of the *Rundschau der Versicherungen*, edited by Herr E. A. Masius, at Leipzig. This periodical is now in the fourth year of publication, monthly, and in the present extension of assurance business to the Continent will be found to contain much valuable information for the managers of English Assurance Companies. For the operations of the year 1851, see vol. iii., p. 164. (7 thalers=£1.)

Name of Company.	Share Capital. £.	Insurances for long or short periods in the year.		Premiums received. (a) Gross. (b) After deducting reinsurance.		Losses paid and Cash deducting reinsurance, but including returns of Premium, &c.		Premium Reserve, Extra Reserve Fund.		Current Risks at the end of the year.		Dividends paid per share.	
		1852. £.	1853. £.	1852. £.	1853. £.	1852. £.	1853. £.	1852. £.	1853. £.	1852. £.	1853. £.	1852. £.	1853. £.
Aix-la-Chapelle & Munich. Assicurazioni Generali, in Trieste .....	428,571	75,425,949	not stated	134,615	149,256	84,249	105,884	213,573	227,827	70,556,316	78,263,033	77,143	7,43
Asiende Assicuratrice in Trieste	190,476	31,537,315	37,944,156	161,806	209,661	162,449	201,643	180,029	204,974	not stated	not stated	4,571	6
Berlin Fire Insurance Comp.	142,857	30,321,462	38,345,156	94,087	64,827	38,624	38,164	34,741	50,392	16,955,117	24,171,727	3,857	8,571
	121,429	not stated	4,547,502	9,401	9,432	4,498	9,432	9,644	10,086	not stated	4,547,502	5 p. ct. loss	none
In 1852, Borussia, in Berlin .....	254,139	ditto	not stated	20,862	22,880	21,431	23,193	10,786	12,028	not stated	not stated	not stated	not stated
In 1853, Colonie, in Cologne .....	284,857	47,758,347	52,667,895	100,137	106,363	75,706	108,726	140,832	148,192	47,758,347	52,667,895	8	3,143
Deutscher Phoenix, in Frank- fort-on-the-Maine .....	448,980	17,713,903	19,756,336	83,824	36,290	29,192	30,733	26,016	40,566	17,713,903	19,756,336	1,469	1,633
Elberfeld .....	285,714	17,869,219	20,895,186	32,286	40,521	18,871	31,304	25,589	31,684	17,869,219	20,895,186	2,429	1,429
Feuer Assoc. Compagnie von 1843, in Hamburg .....	71,429	2,316,816	2,147,932	10,583	9,131	2,417	2,022	39,206	34,186	1,646,753	1,511,664	2,143	2
Fret Austrian Assurance Company, in Vienna .....	285,714	44,343,096	45,967,804	74,789	91,687	57,925	66,839	67,481	83,325	23,751,080	27,968,277	6,190	3,8
Hypoth. und Wechsel Bank, in Munich .....	244,898	14,259,919	14,730,436	32,284	32,885	24,921	21,516	52,125	71,558	14,259,919	14,730,436	not stated	not stated
Leipzig Fire Insurance Comp.	142,857	not stated	not stated	50,517	54,875	36,465	45,748	87,979	92,073	not stated	not stated	7,143	3,571
In 1852, Magdeburg Fire Assurance Company, in Magdeburg .....	142,857	64,188,141	82,503,286	54,175	75,215	47,507	66,908	33,264	42,414	24,354,156	33,305,048	4,286	6,286
In 1853, Pruissan National Assurance Company, in Stettin .....	428,571	13,425,416	16,017,102	32,946	42,084	21,551	41,853	36,354	41,383	13,425,416	16,017,102	1,357	0,19
Rimione, in Trieste .....	180,190	33,199,537	36,059,213	161,520	181,856	128,829	157,217	147,787	171,346	not stated	not stated	4,286	4,762
Silesian, in Breslau .....	285,714	11,601,415	14,183,330	38,160	42,420	32,143	44,578	18,970	25,172	5,717,867	6,773,219	2,429	2
16 Companies	In 1853, 4,226,542	403,960,535	385,715,334	987,391	1,169,152	786,778	995,760	1,124,376	1,286,706	254,008,093	300,807,425		
	16 Comps.	13 Comps.	13 Comps.	15 Comps.	16 Comps.	16 Comps.	16 Comps.	16 Comps.	16 Comps.	11 Comps.	12 Comps.		

† And £7,148 per share for public purposes.

• Exclusive of £23,468 by insurances for 5 years.

From the foregoing totals it will be observed, that the share capital in 1853 of 16 Companies amounted to £4,226,542. To compare the amounts assured during the years 1852 and 1853, it is necessary to take out from the former year the business of one important Company, because the amount is not stated in one of the two years; and also of a smaller one for the latter year, for the same reason; and which, with that of two Companies not stated in either year, reduces the number of Companies for comparison to 12, the amount insured in which in 1852 was £328,534,586, and in 1853 £381,167,832, being an increase of about 16 per cent. in the year. The premiums on the above assurances were in 1852 £781,397, and in 1853 £932,740, being an increase of nearly 19·4 per cent. in the year. The proportion of premiums to sums assured was ·238, or 4s. 9d. per cent., in 1852, and ·245 (4s. 11d.) per cent. in 1853. The losses and costs of management, &c. in these Companies increased from £640,135, in 1852, to £811,503 in 1853, being nearly 26·8 per cent., and were in the former year 81·9 per cent. and in the latter 87· per cent. of the premiums received; in the former case ·195 (3s. 11d.) per cent., and in the latter ·213 (4s. 3d.) per cent., on the sums assured. Assuming that the sums assured not stated bear about the same proportion to the premiums and charges thereon as in those that are known, it may be considered that, in round numbers, about £480,000,000 was insured against fire in the German proprietary Companies in 1853, the premiums received upon which were £1,169,152, and the losses and expenses £995,760, with a premium reserve and extra reserve fund for current risks at the end of the year of £1,286,706.

Comparing these amounts with the summary of the French proprietary Fire Insurance Companies for 1852, given in page 135 of this volume, it will not fail to be perceived how different the nature of the business is, if we may judge from the average of the premiums received, that for France being ·0879 (1s. 9d.) per cent. on the sums assured, whilst in Germany it was ·238 (4s. 9d.) per cent. The losses and expenses together were—in France 83·07 per cent., and in Germany 81·92 per cent., which, upon the larger amount of premiums demanded for the business, would give the latter a considerable advantage. (S. B.)

*Trieste.—Report of the Imp. Reg. Privileg. Riunione Adriatica di Sicurtà, in Trieste, for 1852-3.*—It is stated in the report that the sums assured in this their fifteenth year had increased to £38,000,000, the premiums upon which amounted to £190,000, being £20,000 more than in the preceding year. The total amount of losses was greater than that of the preceding year, having exceeded the large sum of £120,000 by 2,959 claims; but in consequence of reassurances, the actual losses paid by the Company were reduced to £80,000. After setting apart £152,278 for current risks, and adding £3,046 to the reserved fund, there remains a net profit of £10,050, which is increased by the interest arising from the reserved fund, and constitutes a sum of £11,000 to be divided amongst the shareholders. The large amount of £180,000, now forming the reserve fund, will add to the confidence which, by the faithful performance of all the engagements of the Company, the public have hitherto reposed and continue to place in the character of the Company.

In reviewing the past history of the Company it may be interesting to remark, that in the course of its fifteen years' operations the total sums

assured have amounted to £330,200,000, the corresponding premiums to £1,500,000; the profits divided have been £36·633 per share, and the losses paid about £1,000,000; and whilst the shareholders have been liberally rewarded for the use of their capital, they have the satisfaction of reflecting that the philanthropic objects of the Company have been fully carried out.

The directors conclude by informing the shareholders that the resolutions adopted at the last general meeting have been approved by the Ministry of the Interior, authorizing the immediate adoption of the new branches of assurance proposed, but prescribing some modifications in the statutes of the Company, for which a special meeting was called.

*Summary of the Operations of the Riunione Adriatica from 1 July, 1838, to 30 June, 1853.*

Year.	Sums Assured.	Premiums.	Losses Paid.	Dividends per Share.
	£.	£.	£.	£.
1838-9	3,547,976	12,543	975	2·1
1839-40	9,298,763	37,322	19,548	1·5
1840-1	13,880,703	57,697	28,577	1·6
1841-2	16,920,871	74,029	37,653	2·0
1842-3	20,025,419	93,688	49,529	2·5
1843-4	22,436,979	105,005	63,464	2·1
1844-5	20,812,990	96,172	56,711	3·0
1845-6	23,803,364	112,287	76,740	1·6
1846-7	25,692,299	125,156	85,194	2·6
1847-8	26,053,955	123,889	91,630	"
1848-9	19,385,124	76,779	78,593	1·3
1849-50	25,964,950	114,017	65,127	2·7
1850-1	29,693,396	141,966	82,174	3·1
1851-2	34,859,514	169,596	88,890	5·0
1852-3	37,862,174	190,948	120,816	5·5
	£330,238,477	£1,531,094	£945,621	£36·6

*Fifteenth Balance Sheet—1 July, 1852, to 30 June, 1853.*

	£.
Premiums brought forward from last balance-sheet for current risks .	130,989
Reserve for losses not settled . . . . .	6,100
Premiums received for all branches of assurance on total sums assured, £37,862,174 . . . . .	190,948
Profit on exchange of funds . . . . .	4,546
Total . . . . .	332,583
Less premiums for current risks, clear of charges, reassurances, &c. .	152,278
Remaining . . . . .	180,305
From which deduct—	
Total payments for 2,959 losses, less salvage .	£120,816
Less proportion secured by reinsurance . . . . .	40,780
	£.
Approximate reserve for claims not yet paid . . . . .	11,000
Reassurance of £7,794,757 . . . . .	34,236
Discount, bonuses, & brokerage, & returns on £1,570,820 .	11,772
Commission on premiums received . . . . .	18,281
Salaries, rent, postage, printing, travelling expenses . . .	8,738
Interest belonging to shares with 30 per cent. deposit . .	65
Interest due to shareholders on reserve fund . . . . .	950
	165,078
Gross surplus . . . . .	15,227



	Brought forward . . . . .	£15,227	
From which deduct—			
20 per cent. carried to reserve fund . . . . .	£3,045		
Remuneration to directors . . . . .	2,132		
			5,177
	Leaving a net profit of . . . . .	£10,050	
Which, divided amongst 2,000 shares, produces a dividend of £5.015 each.			
	£.		
Reserve fund by last account . . . . .	24,187		
Profit on shares forfeited or reduced . . . . .	402		
Reserve from present profits . . . . .	3,046		
Total reserve fund, 30 June, 1853 . . . . .	£27,635		(S. B.)

## CORRESPONDENCE.

FORMULÆ EXPRESSING THE VALUE OF ALL THE FINES  
PAYABLE ON THE RENEWAL OF COPYHOLD LEASES.*To the Editor of the Assurance Magazine.*

SIR,—It happened to me the other day, in answering a question which occurred in practice, to stumble upon a formula expressing the value of all the fines payable on the renewal of copyhold leases, which is more simple and useable than those which I have since seen in the works of Bailly, Milne, or Professor de Morgan.

Calling  $A$ ,  $B$ ,  $C$ , &c. the values of an annuity of £1 on the lives now in possession;  $P$  the value of an annuity of £1 on any one of the successive lives;  $A$ ,  $B$ ,  $C$ , and  $P$  the value of £1 to be paid on the failure of those lives;  $\rho$  the interest on £1 for a year, and  $v$  the value of £1 to be received a year hence, Milne's formula is, the fine being called  $f$ ,

$$f \frac{A+B+C+\&c.}{1-v^{t'+1}},$$

in which  $t'$  = the number of years' purchase of an annuity certain, equivalent to an annuity on the life of  $P$ .

Professor De Morgan's formula is

$$f \cdot \frac{\frac{n}{\rho} - (A+B+C+\&c.)}{1+P},$$

in which  $n$  represents the number of lives.

The formula which I lately arrived at is

$$f \cdot \frac{A+B+C+\&c.}{1-P}.$$

These two last formulæ are identical in value, and either may be deduced from the other.

Milne's formula is identical in value, but is obtained by the imputation

of an entirely unnecessary equivalent to the value of £1 on the failure of the life which I have called P.

Baily's formula differed from Professor De Morgan's by giving P instead of  $1 + P$  as the divisor. I have a copy of Baily's work in my possession, in which the author has corrected this inaccuracy.

If there is any advantage in my formula, it lies simply in the rejection of unnecessary quantities. The following is the rule in words:—

Add up the values of assurances of £1 on each of the lives in possession, and divide the sum by the complement to unity of the value of an assurance of £1 on the life to be put in on failure of any life.

I remain, Sir, yours truly,

7, New Bank Buildings, Lothbury,  
24 March, 1854.

E. RYLEY.

## THE QUESTION OF INTEREST IN POLICIES UPON THE LIFE OF ANOTHER.

*To the Editor of the Assurance Magazine.*

SIR,—As it is probable that some legislative enactment may shortly be expected, founded upon the recent report of the Select Committee on Life Assurance Associations, in which case the entire subject of life assurance must come under the consideration of Parliament, it seems desirable to direct attention to the Act of the 14 Geo. III., cap. 48, known as the "Gambling Act," with a view to consider whether this measure has really answered the intentions of the legislature; and if not, whether it would be advisable to make some effort for its modification or repeal. The legal bearings of the subject have been very clearly treated by Mr. Bunyon in the first chapter of his recent valuable work; but as the law and the practice are very much at variance, and as the practical operation of this measure is, I think, sometimes misunderstood, perhaps you may consider a few observations upon the subject not altogether out of place in your *Journal*.

The preamble of the Act recites, that "whereas it has been found by experience that the making assurances on lives or other events wherein the assured shall have no interest hath introduced a mischievous kind of gaming": and to remedy this evil the main provisions are—1st, That no one shall be allowed to effect an assurance upon the life of another unless the former have an interest in the life of the latter; and 2nd, That when the life fails, the claimants shall not be entitled to receive more than the amount or value of the interest that they may *then* have in the life in question. It may be remarked (the fact, I believe, not being generally known), that this Act having been passed before the Union, its operation is confined to Great Britain, and does not extend to Ireland.

Now, what effect has this measure had upon the issue of what are ordinarily termed "life of another" policies? Whatever may be the strict legal meaning of the term, it seems to be well understood that the "interest" in these cases must be pecuniary, and that no other will suffice; so that a creditor may assure the life of his debtor, but that a parent, as such, has no legal interest in the life of his child. The consequence has been, that

while difficulties are thrown in the way of effecting assurances for many desirable and praiseworthy objects, policies are frequently granted for purposes which are as much gambling transactions as any that can be imagined. For example: a man has a mother, sister, or other relative dependent upon his exertions, for whom he is desirous of making some provision at his death. The most direct way of accomplishing his object would be by an assurance upon his life, the policy being taken out in the name of the person for whose benefit it is designed. But the law interposes; and even at the present day, several Offices would refuse to grant, and many persons object to effect, such a policy, both alleging the absence of interest and consequent illegality of the transaction. Many similar instances, in which marriage settlements and other family arrangements are involved, will occur to your readers. At present, the usual method of dealing with these cases is by the expensive, cumbrous, and, in the present state of the law in this respect, very unsatisfactory process of deeds of assignment.

On the other hand, it is not at all uncommon for creditors to effect assurances upon the lives of their debtors, in cases where the recovery of the debt is considered hopeless. The existence of the debt is, it seems, sufficient to constitute a *legal* interest in the life, although it is quite obvious that in such a case the creditor's real interest must be in the *death* of his debtor. It is not unusual to hear some such remark as that "A owes me a good deal of money; there is no chance of his paying, and therefore (it is difficult to understand the *sequitur*) I will assure his life." The policy on Mr. Pitt's life, in the celebrated case of "Godsall v. Boldero," seems to have been of this class.

I pass over the provision respecting the amount that may be recovered when the life has fallen in, for the simple reason that in this respect the law is a dead letter, and habitually disregarded in the public sales of policies that occur almost daily. It is the invariable practice of the Offices to pay claims in full, without any inquiries being then made about the claimant's interest.

But a remark may be added upon the influence this measure has had in determining upon the acceptance of proposals.

Those who are acquainted with the practice of Life Offices several years ago, are aware that the question of interest (particularly when the proposals were transmitted through agents) was one of the most prominent in the minds of directors, more so than the health and habits of the life proposed; and it has been contended by some gentlemen, whose opinions are entitled to great respect, that the high mortality which the Experience of the Offices proves to have prevailed among Irish assurances is to some extent attributable to the fact of the "Gambling Act" not extending to Ireland. But, so far as it has had any effect at all, it seems more reasonable to conclude that it has had an evil influence in diverting the attention of boards of directors from the real questions at issue—viz., the health and habits of the lives proposed, and the sufficiency of the motives for effecting assurances upon them. It seems not to have been borne in mind, that a strict legal interest in the life might coexist with a thoroughly speculative assurance.

If then it can be proved that this Act is to a great extent systematically disregarded—that it has not discouraged gambling assurances, but rather the contrary—and that it fetters and interferes with legitimate transactions—I venture to submit, that at a fitting opportunity the question of its repeal may advantageously be considered. All experience seems to prove that,

where contracting parties meet upon fair and equal terms, the less the law interferes with them the better; and in all recent economical legislation this principle has been recognized.

I am, Sir,

Your very obedient Servant,

ARTHUR H. BAILEY.

*Eagle Insurance Office, May, 1854.*

#### DECIMAL NUMERATION AND DECIMAL COINAGE.\*

*Cardrona, Peebles, 27th April, 1854.*

DEAR SIR,—I have read with much pleasure and approbation your pamphlet on *Decimal Numeration and Decimal Coinage*; and as during a long mercantile life, in various countries where a decimal coinage was the currency, I have used the decimal numeration in calculating, with my own hand, more than most merchants are in the habit of doing (they generally delegating that work to their clerks), I hope I may be excused for offering some of my experiences to your consideration.

But before entering upon that subject, I may state that I think favourably of your plan of the *shilling unit* for a new coinage, which would certainly “be the means of introducing the decimal system, with the minimum of change,” as recommended in the Report of the Committee of Parliament. But I think that this might be effected even more simply than you propose—viz., by merely abolishing the penny and farthing, and substituting in their place *cents* of the shilling. This is in reality what you do, only you call them *mills* of a ducat. The introduction of a new denomination (the ducat) I consider both objectionable and unnecessary, as I shall proceed to demonstrate.

All authorities seem agreed that the pound sterling, as the highest denomination of our currency, must be retained; and my proposal is, that accounts should be kept in pounds, shillings, and cents of a shilling. This, though apparently a departure from a decimal system, is more so in appearance than in reality. In adding a number of sums together, it is *practically* as easy to *carry* to pounds from a column of shillings as from a column of florins on the decimal plan; and for purposes of calculation, it will be only necessary to make a preliminary reduction of the pounds into shillings (as simple an operation as reducing them to ducats on your system), and to reconvert the result into pounds, which is equally simple. Take, for example, the sum of 4 pounds 6 shillings and 9 pence. To express this decimally, in the pound unit, requires 5 *digits*, thus, £4·3375; whereas, to express the same sum in the ducat and the shilling units requires only four. Thus—

In the ducat unit	.	.	.	.	D.8·675;
In the shilling unit	.	.	.	.	Sh.86·75;

in both of which the *digits* are identical, and therefore the calculations made with them will be equally short and equally easy. This proves your introduction of a new denomination, the “ducat,” to be unnecessary.

But after all (with due deference to the high authorities quoted by

\* The following letters have been obligingly placed at our disposal by Mr. Thomson, and we gladly avail ourselves of his permission to lay them before our readers.

you), I must say that I consider the measure of a decimal *coinage* of no use or importance, unless all our weights and measures were also decimally divided; which I will afterwards show to be *impracticable*. Any schoolboy of twelve years of age can reduce shillings, pence, and farthings to the decimal of a pound "*by inspection*:" at least I was taught to do so, at that age, in a parish school fifty years ago, and have practised it ever since; and our schools are much improved since that day. When I afterwards went to my apprenticeship, at the age of 15, I recollect studying a book you so justly commend—*Leslie's Philosophy of Arithmetic*—and which I have not since seen; but I think it was from it I first learnt the *defects* of the decimal division; and that, if man had been created with twelve fingers in place of ten, we should have had a more perfect system of arithmetic—the *duodecimal*, with twelve digits or *Arabic numerals* instead of the present ten. This, however, is now hopeless: but the defects of the denary division remain—viz., that 10 has only two *factors*, 2 and 5; while 12 has four, 2, 3, 4, and 6, by which halves, quarters, thirds, and sixths can be expressed: and this is the reason why the shilling is conveniently divided into twelve pence, the foot into twelve inches, the troy pound into twelve ounces, &c. The division of the avoirdupois pound into sixteen ounces is also most convenient, because that division is made by repeated bisections. Ten can be halved, but it cannot be quartered, without another step in the decimal scale; while a third, a sixth, and a twelfth, cannot be expressed by any possible extension of the decimal notation. It can only be divided into halves, fifths, and tenths; and no one ever wants the fifth or the tenth of a pound of tea or of anything else. The reason seems to be that, in spite of our ten fingers, fifths and tenths are not *natural* divisions. Try, for example, to divide a piece of string, of any convenient length, into five or ten equal parts. It cannot be done, except by continued *guess* trials; and whether you hit upon it the first trial, or the hundredth, or the thousandth trial, it is impossible to say. But the same string can be easily and exactly folded into three equal parts, which, doubled, divides it into six; and these doubled again, divide it into twelve equal parts. Thus, however admirable the decimal division may be for facilitating calculations with the pen, it is of most inconvenient manipulation when you come to use it with material substances, such as weights or measures.

It is for some such reasons as these that the French, after having, with all the pride of science, introduced their *système metrique*, found that for many common purposes it was *unuseable*;\* and they were obliged to substitute in its place what is called the *système usuel*, by which a half kilogramme is made into a pound, divided into twelve ounces, and the ounce into eight gros. Similar to our apothecary's weight, 8 drams = 1 ounce, 12 ounces = 1 pound. No decimally divided weights are used in any shop in France: if you were to ask for a hectogramme or a decagramme of tea or sugar, you could not get it. But all these matters were most ably investigated and considered many years ago, by Committees of both Houses of Parliament (particularly by the Lords!) on the subjects of weights and measures, and cash payments and currency. These reports and evidences are well deserving of being studied by our "modern philosophers" of the present day.

Even in the simpler matter of coinage, it is a most difficult thing for the

\* It led to so many difficulties, that, by a Royal decree in 1816, the use of weights and measures decimally divided was absolutely prohibited in shops or any kind of retail business.

*mind* of man to comprehend a change. Of all men in the world, one would think that a Paris banker, after sixty years' experience, would have some *mental perception* of what a *centimme* is. But I will prove to you that he can only *think* in *sous*. Take any Paris lists of the Exchange on London, and you will find that it invariably rises and falls by intervals of *sous* and half *sous*, as follows:—

25-00	25-07½ = 1½ Sou.
25-02½ = ¼ Sou.	25-10 = 2 "
25-05 = 1 "	&c. &c.;

and you will never find a quotation ending with 1, 3, 4, 6, 7, 8, or 9 centimmes!

In Marseilles (though the *système metrique* has been the law for sixty years), commercial transactions, even in wholesale, are still carried on in the *poid de table* and the *livre tournais*, the result only being reduced into francs. In Genoa, where the French metrical system was introduced thirty years ago, the old coinage called in, and francs now the only currency in the place; yet still, all mercantile transactions, both in wholesale and retail, are carried on with the old Genoese cantar and pound, and the price in *livres fuori banco*, the results being reduced into francs in the proportion of five to six in wholesale, and of four to five in retail! But a yet stronger instance of the pertinacity with which the *mind* retains its old *ideas of value* is found in Venice. There, in 1796 or 1798, the French totally extirpated the Venetian *lira piccola*, and substituted the *franc* as the only currency. About 1820 the Austrians introduced the half florin, or *lira Austriaca*, which is now universally used as the money of commerce. But in retail shops, and small taverns frequented by "*the people*," the account is still always made in *lire piccole*, which have not been in existence for more than sixty years, and which have to be converted into the *actual* currency by a most impracticable fraction, very difficult to manage with the *pen*, but which the natives perform *mentally* with the greatest facility.

I have mentioned these instances to show that, though it is very easy to make a law on the subject, yet it is very difficult to change men's *ideas* of measure and value. A hundred years' experience would not familiarize the nation to any great change in moneys, weights, and measures; and before that time expired they would again be altered, either by law or by usage. We have a melancholy instance of perverse alteration of a desirable regulation for uniformity of measure in our own country. In most markets of the kingdom corn is sold by the imperial quarter, or bushel; but in Liverpool, Hull, Glasgow, and some other places, though it is *nominally* sold by the *bushel measure*, in order to keep within the law, yet it is *actually* sold by the *pound weight*; so that no person, not in the corn trade, can form any idea of the relative prices of wheat in the markets of Edinburgh and Glasgow.

Without any legislative enactment or change of measures, the decimal system might be advantageously adopted voluntarily in mensuration. Why should the fractional parts of an *acre* be expressed in roods, perches, &c., when the instrument used in the measurement (the chain) is decimally divided, and the result of the calculation comes out in decimal parts (square chains and links), which it requires much trouble to convert into square roods, square perches, and square yards—all most impracticable and incomprehensible quantities? Again: if the common foot-rule used by carpenters

were divided, as at present, into inches and eighths of an inch on one side, and on the other side into tenths and hundredths of a foot, the using this last side would much facilitate all measurements where cubic or solid contents were required. It would be most convenient to the shipmaster, in measuring for freight—to the farmer, in gauging his manure heaps—and to the poor breaker of stones by the wayside, in measuring his piles of road-metal.

I could say a great deal on the facility with which foreign exchanges, and the value of commodities in different countries of the world, can be compared with one another by the use of the "chain rule" and by the German method of "fixed numbers," in which calculations *decimals* can be readily used with the pen, though the *things* themselves be not decimally divided; but I have already encroached too much on your time and patience, which I beg you to excuse, and to believe me, dear Sir,

Yours very truly,

ALEX. M. ROBERTSON.

To. Wm. Thos. Thomson, Esq., &c.,  
Edinburgh.

Cardrona, 11th May, 1854.

DEAR SIR,—In my letter to you of the 9th inst., I said that when I heard from you again I might give you my ideas on decimalizing our commercial weight. But I have since thought it as well to put my ideas on paper while they were in my head; and I now send them to you for what they are worth.

The basis of our metrical system, the seconds pendulum, is more elegant and more easily ascertained than that of the French system, which is the quadrant of the terrestrial meridian. A pendulum vibrating seconds at London, and at the temperature of 62°, was found to measure 39·13929 inches of the existing standard scale. This length of the pendulum might have been adopted as a *new yard*, or *metre*, and an entirely new system of weights and measures formed upon it, as was done in France. But our philosophers who conducted the investigation were wiser. They knew the danger and inconvenience of changing long established institutions; and as the length of the inch could at any time be easily verified by the pendulum, they resolved to retain the inch as the foundation of our imperial metrical system. Consequently, from it all our linear and square measures are formed—as feet, yards, miles, acres, &c. A cubic inch of water was found to weigh 252·458 troy grains; and 7,000 such grains were made the avoirdupois pound, whose subdivisions and multiples form our commercial weights—as ounces, hundredweights, tons, &c. Again: 10 such pounds of water form the gallon, from whose subdivisions and multiples all our measures of capacity are derived—as pints, pauceons, tuns; pecks, bushels, quarters, &c. A system more accurate, simple, and convenient, could hardly have been devised, and ought *never* to be altered.

But as there is now a very general desire to facilitate commercial calculations by the use of the decimal arithmetic, I think some small alteration in the *divisions* of our commercial weight might be advantageously introduced. Hundredweights, quarters, and lbs. are very troublesome in calculation, and they are almost the only quantities that *are* troublesome. There is no difficulty, for example, in finding the value of cloths by the yard, of

liquids by the gallon, or of corn by the quarter or bushel; no other denominations, indeed, being used in commerce. I therefore propose only to alter our weights by abolishing the hundredweight of 112 lbs. and its quarters, and adopting a new hundredweight of 100 lbs., and a new ton of 20 such cwts.; the new denominations to be tons, cwts., and lbs.: thus—100 lbs. = 1 cwt.; 20 cwts. = 1 ton.

I apprehend that the introduction of the new cwt. would be attended with no inconvenience whatever, but the contrary; the new ton, however, would at first be productive of some little confusion, and particularly in the estimated *tonnage* of ships. But as we have already *two* modes of measuring ships for tonnage, called *old* and *new* measurement, and are likely soon to have a *third*, if the proposed new ton were used in the intended new mode of measurement, no inconvenience would result. And if for any purpose it were desired to compare the new ton or new tonnage with the old, it could be easily done, the proportion being as 100 to 112.

The departure from the decimal division in making the higher denomination to consist of 20, in place of 10, of the next lower, instead of being a defect, is an advantage, when taken in connection with the division of money that I advocate—viz., pounds, shillings, and cents; because the divisions of both the money and weight would be equal and similar—thus:

$$\begin{array}{l} 1 \text{ pound} = 20 \text{ shillings; } 1 \text{ shilling} = 100 \text{ cents.} \\ 1 \text{ ton} = 20 \text{ cwts.; } 1 \text{ cwt.} = 100 \text{ lbs.} \end{array}$$

This arrangement is productive of the very great advantage, that the price in money and weight of a lower denomination is the same as in the money and weight of the higher denominations, and *vice versa*: thus,

$$\begin{array}{l} 5 \text{ cents. per lb.} = 5 \text{ shillings per cwt.} = £5 \text{ per ton;} \\ £8 \text{ per ton} = 8 \text{ shillings per cwt.} = 8 \text{ cents per lb.} \end{array}$$

By making the very small alterations I recommend (at the bottom of the moneys and at the top of the weights), I consider that every necessary facility of calculation would be attained; and certainly with “the *minimum* of change,” as recommended by the Parliamentary Committee.

I remain, dear Sir,

Yours truly,

ALEX. M. ROBERTSON.

To Wm. Thos. Thomson, Esq., &c.,  
Edinburgh.

NOTE.—Take an example of calculation by the present and proposed weights and money. Required the cost of 2 tons 16 cwts. 2 qrs. and 23 lbs. pig iron, at £5 per ton. The usual way of calculating it by “practice” would be—

Tons.	cwts.	qrs.	lbs.	
2	16	2	23	
	× 5			
£14	0s.			
	2	6d.	= 2 qrs.	
		7½	= 14 lbs.	
		3¾	= 7 lbs.	
		1¼	= 2 lbs.	
£14	3	6¼	& ¼d.	



Here the quarters and pounds are very troublesome, and in some cases they are even more so. The foregoing fractional parts of the cwt. are nearly equal to  $\frac{71}{160}$  of a cwt., and therefore would be expressed as 71 lbs. in the proposed new division; and the operation would be simply,

$$\begin{array}{r} \text{Tons. cwt. lbs.} \\ 2 \quad 16 \quad 71 \\ \times \quad 5 \\ \hline \text{£14} \quad 3\text{s.} \quad 55 \text{ cents.} \end{array}$$

I have purposely left the tons and cwts. unaltered, in order to show the correspondence of the calculations; but the same *quantity* of iron (6,351 lbs.) would be expressed in the proposed new weight as 3 tons 3 cwts. 51 lbs.

## REPORTS OF ASSURANCE COMPANIES.

*Clerical, Medical, and General Life Assurance Society.*—*Annual General Meeting, March 2nd, 1854.*—The report stated that the number of new policies issued during the year ending June 30, 1853, was 605. This is the largest number ever granted by the Society in any one year. As compared with 1852, it exhibits an increase of 138; and it is nearly double the average number issued during the three preceding years. The sum assured, which also represents the largest amount of business transacted in any single year, was £299,508; being £43,379 in excess of the sum assured in 1852. The new premiums receivable on these assurances amounted to £10,567. The annual income of the Society now reaches £143,159, and the sum laid by during the year was £52,332, which, being added to the previous accumulations, raised the consolidated or business fund (belonging exclusively to the assured) to £922,328.

The directors, anxious to advance the interests of the Society by adopting every improvement which comes recommended to them by the enlarged experience of life assurance, have resolved to issue *whole world policies*, which give the person whose life is assured permission to go at any time to all parts of the globe, on payment of a fixed but moderate rate of premium. They also desire to call the attention of the meeting to another important resolution which they have adopted—viz., that if a person whose life is assured go beyond the limits fixed by the policy without the knowledge of the party interested therein, the interest of such party shall not suffer thereby, provided within fourteen days of the fact becoming known to him, intimation of it be given to the Society, and a corresponding rate of premium paid.

The directors recommended that certain alterations should be made in the deed, by which policies of twelve months' standing should not be affected in case of death by suicide, duelling, or the hands of justice.

*The Colonial Life Assurance Company.*—*The Seventh Annual General Meeting, held the first day of November, 1853.*—The report stated that during the seventh year of the Company's business, extending from the 25th May, 1852, to the 25th May, 1853 (the period to which the present

report has reference), the directors have received 567 proposals, for assurance of sums to the amount of £311,644. 11s. 6d., and have issued 478 policies, assuring £256,311. 11s. 10d.; the difference—that is, 89 policies, for assurance of £55,332. 19s. 8d.—having been declined or withdrawn.

The following tabular view shows the business proposed to the Company and actually transacted since its commencement in 1846:—

Date.	Assurances Offered.			Assurances Effectd.			Annual Premiums.			No. of Policies.
	£.	s.	d.	£.	s.	d.	£.	s.	d.	
May 25, 1847				102,274	11	0	4,878	8	1	112.
" 1848	505,855	3	0	160,502	12	0	6,466	11	9	215
" 1849				129,938	15	0	4,635	10	9	205
" 1850				162,492	8	0	6,734	17	10	241
" 1851				184,408	13	7	7,281	1	4	274
" 1852	247,281	1	0	205,111	17	0	8,713	1	8	319
" 1853	311,644	11	6	256,311	11	10	10,455	14	9	478
	1,530,490	9	10	1,201,040	8	5	49,165	6	2	1844

The number of deaths and the amount of the sums assured are but a very small proportion of what might have been expected, twelve lives only having fallen, on which assurances had been effectd to the amount of £6,649. 15s.

The following table exhibits the total claims as they have arisen in each year:—

Date.	No. of Lives Assured.	No. of Deaths.	Amount.		
			£.	s.	d.
First year .....	112	None			
Second " .....	307	2	870	15	3
Third " .....	473	6	3,449	19	0
Fourth " .....	635	3	2,699	19	0
Fifth " .....	837	7	4,699	18	0
Sixth " .....	1,089	7	3,249	19	0
Seventh, " .....	1,474	12	6,649	15	0
	4,927	37	21,620	5	3

It thus appears that thirty-seven deaths only have occurred since the commencement of the business, representing claims to the amount of £21,620. 5s. 3d.; and to enable the proprietors to form their own estimate of that result, a column has been given, showing the number of lives on the books at the end of each year—4,927 years of life, it will be perceived, have been subject to risk, while the deaths have only averaged three-fourths per cent. on the whole. Some allowance must be made for assurers in their first year having been on the Company's books for a shorter period than a year; but even making every deduction for that consideration, the mortality would not average one per cent.—being about the same extent of mortality as select lives of thirty years would be subject to if all resident in this country under the most favourable circumstances.

*Orion Life Assurance Company—Extracts from the Report, 1853.*—During the last seven years 1,699 proposals have been submitted to the directors, of which 215 have been declined from prudential motives; 104 were not proceeded with, and 1,380 policies were issued—assuring the sum of £780,415, and producing annual premiums amounting to the sum of £27,079.

The number of policies in force of the ordinary description of assurance is 2,968, assuring the sum £1,940,530. 12s., producing a present annual income of £64,824. 15s. 10d. There are also 80 policies for endowments, immediate, deferred, and survivorship annuities, yielding a further income of £672. 5s. 5d., these making a total of policies in force of 3,048, with a corresponding annual premium of £65,497. 1s. 3d.

The value of every policy has been computed separately by a process involving *only the mathematical or true premium*, and such portion of the charged premium as was originally added to defray expenses, provide profits, and form a precautionary fund to meet adverse contingencies, has been scrupulously reserved to accomplish its intended purpose of *affording protection for the future*. The application of this principle effectually prevents a distribution of profit before it is created, and gives to the assured a reasonable prospect of obtaining proportionate bonuses at future divisions.

It was stated at the last division that the total value of policies in force (independently of the bonus then declared) was about 50 per cent. of the premiums received under such policies; at the present valuation a like ratio between the values of the existing policies and the premiums received under them is observable.

<i>Assets.</i>		£.	s.	d.
Government securities	.	196,050	11	4
Mortgages and loans on policies	.	390,829	2	7
Fractional interest accrued to 25th March	.	5,835	3	10
Due from agents	.	6,932	19	3
Deposited at Union Bank, and bankers' balance	.	20,187	0	8
Value of reassurances and sundries	.	5,970	1	10
Total assurance fund *	.	£625,804	19	6
<i>Liabilities.</i>		£.	s.	d.
Value of policies with additions	.	503,185	4	7
Claims determined but unpaid	.	25,264	18	4
Sundry accounts	.	1,895	5	0
Loan from proprietors' fund	.	5,200	0	0
Premiums paid but not due	.	572	15	9
Total liabilities	.	£536,118	3	8

Comparing these statements, we have—

	£.	s.	d.
Total assets	625,804	19	6
Total liabilities	536,118	3	8
Surplus	£89,686	15	10

From this statement it appears that there is a divisible surplus, after every proper reserve has been made, of £89,686. 15s. 10d. This surplus

\* This is exclusive of the proprietors' fund, which is separately invested, and from which alone the dividends to shareholders are derived.

has been divided between the shareholders and the assured in the proportions prescribed by the deed of settlement, giving to the latter reversionary bonuses amounting to £106,008, or  $28\frac{1}{2}$  per cent. on the premiums from which it has been derived—viz., those paid within the septennial period under policies of at least three years' standing; while 97 per cent. on the original amount paid on the Company's shares is added to the guarantee fund, furnishing an additional permanent protection to the interests of the assured.

It may be added that, comparing the present amount of the shareholders' fund with the total value of the Company's liabilities, inclusive of the bonus now to be declared, such fund affords to the assured a protection equal to 23 per cent. of the liability, over and above the security afforded by the assurance fund itself.

By a reference to the auditors' report, it will be found that the sum which has now been accumulated for the protection of the assured, and as a fund for future claims, amounts to £626,000, while the income derived from the premium fund alone is nearly £90,000 per annum.

In the course of the last septennial period the country has been visited by two severe epidemics, cholera and influenza, each proving very destructive to human life; but these calamities have not produced, in the experience of the Crown Life Assurance Company, any excess in the *rate* of mortality, the fact being that the *number* of deaths which have accrued has been less than might have been expected, according to the Office tables; but, in consequence of the claims having fallen principally upon policies for sums exceeding the average, the total amount of claims exceeds the estimate by about £4,700. This, spread over the amount of claims which have occurred in the period, makes their gross amount  $1\frac{1}{2}$  per cent. greater than was estimated.

The bonus now to be allotted will be as under :—

Age at entering.	Sum Assured.	Complete Years Assured.	Annual Premium.	Total Premiums paid.	Bonus.	Per Cent. on Premiums paid.
	£.		£. s. d.	£. s. d.	£.	
20	1,000	6	19 19 2	139 14 2	61	43 $\frac{3}{4}$
30	"	"	25 3 4	176 3 4	66	37 $\frac{1}{4}$
40	"	"	32 5 10	226 0 10	66	29 $\frac{1}{2}$
50	"	"	44 9 2	311 4 2	79	25 $\frac{1}{2}$
60	"	"	63 11 8	445 1 8	98	22
70	"	"	115 3 4	806 3 4	175	21 $\frac{3}{4}$

The number of annual premiums which have been received on the policies, in respect to which the present bonus is applied, vary from three to seven; and having regard to the total of them, the amount of the bonus gives an average slightly exceeding £1 per cent. per annum.

The total bonus added to policies effected in the first year of the Company's existence, inclusive of the addition now to be made, varies from £222 to £350 for each £1,000 insured, showing an average annual bonus of rather more than £1 per cent. during the twenty-eight years of the Company's existence, and thus presenting a striking uniformity of success over the whole period.

*Equitable Life Assurance Society.—General Cash Account for the Year ending 31st December, 1853.*

Dr.	No. of Policies.	Annuities Assured.	Sums Assured.	Cash Received.		
				£.	s.	d.
Assurances on single lives . . . . .	127		157,850	5,676	4	6
Gross sum after an assigned time . . . . .	1		500	17	13	6
Survivorship for continuance . . . . .	1		1000	26	7	6
Annuity after an assigned time . . . . .	1	100		15	10	0
Survivorship annuities . . . . .	2	70		21	14	6
<b>New assurances . . . . .</b>	<b>132</b>	<b>170</b>	<b>159,350</b>	<b>5,757</b>	<b>10</b>	<b>0</b>
Entrance money . . . . .				429	1	6
Policy money . . . . .				273	18	6
Extra premiums for sea risk and residence out of Europe . . . . .				755	3	6
Commuted premiums . . . . .				1,723	14	0
Annual premiums on old assurances . . . . .				210,570	8	6
Forfeits . . . . .				72	15	0
Dividends on stock . . . . .				115,650	0	0
Interest on mortgages . . . . .				142,970	19	0
Interest on Exchequer Bills . . . . .				1,137	10	0
Cash for stamps rendered useless by reason of the new Stamp Act . . . . .				325	13	8
				<b>479,666</b>	<b>13</b>	<b>8</b>
Cash repaid which had been lent on mortgage . . . . .				137,011	2	9
The produce of £20,000 Exchequer Bills sold . . . . .				20,115	16	8
The produce of £20,000 stock sold out of the 3 per cent. Consolidated Bank Annuities . . . . .				19,537	10	0
Balance brought from the 31st December, 1852 . . . . .				34,565	5	1
<i>Stock in the Funds.</i>						
£1,375,000 in the 3 per cent. Consols . . . . .	£3,835,000, Three per Cents.					
£1,960,000 in the 3 per cent. Reduced . . . . .						
Exchequer Bills . . . . .	£30,000					
Cash on mortgage (including £1000 secured by the assignment of a claim for that amount by a son of one of the mortgagors), £3,948,433. 15s. 11d.						
				<b>£690,896</b>	<b>8</b>	<b>2</b>
<b>Cr.</b>	<b>Lives.</b>	<b>Policies.</b>		<b>Cash Paid.</b>		
Claims paid on policies included with- in the privileged number of 5000 . . . . .	O.S. 90 N.S. 85	100 102				
	175	202	256,682	10	0	
Claims paid on policies not included in the above number . . . . .	1	1	1,000	0	0	
	176	203		257,682	10	0
<b>Additions to claims . . . . .</b>				<b>303,352</b>	<b>18</b>	<b>0</b>
				<b>561,035</b>	<b>8</b>	<b>0</b>
Annuities to claimants . . . . .			1,071	12	0	
Ditto paid pursuant to orders of the general court . . . . .			725	0	0	
				1,796	12	0
<b>Income tax—</b>						
On dividends . . . . .	£3,373	2	6			
On interest of mortgages . . . . .	4,169	18	7			
On interest on Exchequer Bills . . . . .	33	3	6			
Returns of premiums and forfeits . . . . .				507	5	6
<b>Sundry disbursements, viz.—</b>						
General expenses . . . . .			494	10	6	
Rates and taxes . . . . .			243	18	9	
<b>Carried forward . . . . .</b>			<b>£738</b>	<b>9</b>	<b>3</b>	<b>£570,915 10 1</b>

	Brought forward	£738 9 3	£570,915 10 1
Stamps		416 15 0	
Assessor of the City of London for income tax on salaries		142 18 4	
Directors' attendances for the year ending			
5th May, 1853	£2,000 0 0		
Less income tax	58 6 8		
		1,941 13 4	
Auditors for the year 1852		126 0 0	
Stationery for the year 1852		62 3 7	
Coal		37 16 0	
Printing for 1852		81 19 6	
Painter's and glazier's work ditto		43 13 8	
Ground rent		67 19 2	
Law charges for the year 1852		178 7 10	
Salaries		2,857 10 0	
			6,710 5 8
Cash paid for surrendered policies—			577,625 15 4
Lives included in 5,000 O.S. 1	Policies 1		
" " N.S. 18	" 23		
" " " 19	" 24		
Not included	1	1	
	20	25	
			3,147 12 0
Cash paid for £26,610 additions surrendered			19,771 7 0
Cash laid out on mortgage			15,000 0 0
£50,000 Exchequer Bills purchased			52,425 0 0
Balance remaining on the 31st December, 1853			17,926 13 5
			£690,896 8 2

*London Life Association.*—Report presented by the Court of Directors to the Special General Court held on the 23rd November, 1853, for the purpose of considering and approving the Bill presented to Parliament, entitled "A Bill to enable the London Life Association to increase the Amount authorized by their Deed of Settlement to be Assured on a Single Life in the said Society."

"At various times during the last thirteen years the attention of the general court has been called to the subject of assuring a larger sum than £5,000 on a single life, and on each occasion the general court has concurred with the directors in the opinion that it was not then expedient to assure a larger sum.

"Recent events, however, have led the court of directors to reconsider the question. They have observed that in the last session of Parliament several measures were passed by the legislature tending to encourage habits of prudence, and holding out greater inducements to persons to effect assurances than previously existed. This is exemplified in the Act for reducing the Stamps on Life Policies, and in the Income Tax Act, which, with some qualifications, allows the premiums of assurance to be deducted from the amount of income on which the tax is to be assessed.

"These measures, avowedly, have for their object the encouragement of life assurance, and there can be no doubt that they will have that effect; but the measure, more than any other, which may be expected in course of time to lead to an extension of the practice of life assurance, is the Succession Duty Act, which there is reason to think will induce the middle and higher classes more generally to effect assurances by means of which the duty now payable at death under this Act may conveniently be provided for.

"It appears that the largest sum which by the rules of the Society could be assured on one life in the year 1820, was £4,000, and at that time the total sum assured on all lives was £2,037,000; it now exceeds £6,000,000. The invested capital was then £293,000; it now exceeds £2,400,000. The gross amount of annual income from premiums and interest was £86,400; it now exceeds £310,000. So that, with an increase of nearly £4,000,000 in the amount assured, an increase of more than £2,100,000 in the capital invested, and of more than £220,000 of annual income, the sum assured on one life has been increased only from £4,000 to £5,000. Moreover, the past experience of the Society shows that no undue amount of mortality is to be expected amongst the largest assurers, but on the contrary, that the largest assurers are in general the best lives.

"The directors are, therefore, of opinion that the time has now arrived when the amount to be assured on a single life may, with safety and advantage to the Society, be extended beyond £5,000, and the directors recommend the general court to authorize them to apply to Parliament for an Act to remove the restrictions contained in the 54th clause of the deed of settlement, so as to enable the Association to effect assurances for more than £5,000 on a single life."

"The clause in the Bill provides that the limit of the sum to be assured shall be from time to time fixed by the general courts, but not to exceed £10,000 on a single life.

*London Mutual Life and Guarantee Society.—Annual General Meeting of the Proprietors, held 7th July, 1852.*—The report stated that between the 1st January and the 31st December, 1851, there were issued by the Society 620 policies, assuring the sum of £92,443, exclusive of annuities, deferred and contingent, amounting to £225 per annum; of these, 513 were for the whole term of life on the terms of a participation in the profits; 10 on joint lives; and 97 for limited periods, deferred annuities, and endowments. The sum of £2,231 has been advanced during the year, by way of loan, to members on approved security; and the gross amount since the commencement has been £5,521. No loss has yet fallen upon the Society in connection with this branch of its business. During the existence of the Society, three policies only have become claims:—in 1851, two claims paid at Swansea and Dursley, £200; in 1852, one in April, £150.

The average age of the assured is  $36\frac{3}{10}$  years. The average amount of the policies is £238. 8s. 9d. The average amount of the premiums, £3. 1s. 5d.

The assets of the Society are as follow—

	£.	s.	d.
Balance at bankers . . . . .	1,522	15	11
Cash in office . . . . .	72	16	1
	<hr/>		
Petty cash in hand . . . . .			20 0 6
Policy stamps in hand . . . . .			22 0 6
Loans, balance of amount on loan . . . . .			2,918 9 5
India bonds at cost . . . . .			2,080 15 0
Office furniture . . . . .			543 17 0
	<hr/>		
	£7,181	13	1

Making a total in assets of £7,181. 13s. 1d. The number of policies issued since the commencement of business in October, 1849, is 1,791,

assuring the sum of £283,828, and yielding an annual income of £9,256. 8s. 8d. Proposals have been received for assurances to the amount of £463,959 during that period. There are existing 1,379 policies, assuring £223,588, and yielding an income of £7,219. 2s. 11d. There have been lapsed policies to the amount of about £1,800, which otherwise would have made a total of £9,000 gross income. The average amount of assurances for the whole period of life is £238. 8s. 9d. The present average age of 351 lives assured in 1849 and 1850, whose policies are now in force, is 38½ years; of 309 lives assured in 1851, the average age is 35¾; of 169 assured in 1852, the average age is 34<sup>3</sup>/<sub>10</sub> years; and the present average of the aggregate number of persons assured for the whole period of life is 828, and their average age is 36<sup>3</sup>/<sub>10</sub>. The progress of the Society will appear from the following statement of the business done:—The amount received in 1849 and 1850, £4,432. 11s. 5d.; in 1851, £5,773. 1s. 8d.; in the six months ending 30th June, 1852, £3,654. 18s. 1d.—being at the rate of £7,800 in the year, which will exceed the business of the corresponding half year in 1851, exclusive of the new proposals that may be expected to come during the current half year, and showing an annual income of £7,219. 2s. 11d.

The lapsed policies bear the following proportion to the total business effected:—22 per cent. on the number of policies, 21 per cent. on the amount assured, 21 per cent. upon the annual income. The amount received upon lapsed policies has been £1,557. 12s. 3d., which, after making every allowance for the expense of medical examinations, policy stamps, and for the time during which each risk was incurred, leaves a profit to the Office of between £400 and £500. In 1851, 618 policies were completed, for £139,242; but between the 1st January and the 30th June, 1852, 317 policies were completed—being at the rate of 634 policies for the year against 618 last year, for £150,526; being an increase of more than £11,282 upon last year.

*Marine Life and Casualty Assurance Society.*—*Annual Meeting of the Proprietors, 15th February, 1854.*—The report stated that, while for the six months ending December 31st, 1852, premiums to the extent of about £3,000 were received, the succeeding twelve months have increased that amount by a sum little short of £11,000.

The chairman, in moving the adoption of the report, said that the objects of the promoters of the Society were being gradually accomplished, and seafaring men were becoming alive to the necessity of securing support to themselves and to their families in time of need and danger. During the last year 1,000 of that class had insured in the Office for sums varying from £20 to £1,000, or had taken out annuities for from £10 to £50, either for themselves or as annuities for their wives and for the education of their children.

A sum of £300 was then voted for the past services of the directors, and a like sum for the current year.



## ORIGINAL TABLES.

Table showing the Present Value of £1 per Annum for any number of Years not exceeding 100, at the following rates of Interest.

Years.	1½ per Cent.	1½ per Cent.	1½ per Cent.	1½ per Cent.	2½ per Cent.	2½ per Cent.	2½ per Cent.	2½ per Cent.
1	·9888	·9864	·9840	·9816	·9791	·9768	·9744	·9720
2	1·9667	1·9595	1·9522	1·9451	1·9380	1·9309	1·9239	1·9169
3	2·9337	2·9193	2·9050	2·8909	2·8768	2·8629	2·8491	2·8354
4	3·8899	3·8662	3·8426	3·8193	3·7962	3·7733	3·7506	3·7282
5	4·8355	4·8002	4·7652	4·7306	4·6964	4·6625	4·6291	4·5960
6	5·7706	5·7215	5·6730	5·6251	5·5778	5·5312	5·4851	5·4397
7	6·6953	6·6303	6·5663	6·5032	6·4410	6·3797	6·3192	6·2597
8	7·6097	7·5268	7·4453	7·3651	7·2861	7·2085	7·1320	7·0568
9	8·5139	8·4112	8·3102	8·2111	8·1137	8·0180	7·9240	7·8316
10	9·4080	9·2835	9·1614	9·0416	8·9241	8·8088	8·6958	8·5848
11	10·2922	10·1440	9·9989	9·8568	9·7176	9·5813	9·4478	9·3170
12	11·1666	10·9929	10·8230	10·6569	10·4946	10·3358	10·1805	10·0286
13	12·0312	11·8302	11·6340	11·4424	11·2554	11·0728	10·8945	10·7204
14	12·8863	12·6562	12·4319	12·2134	12·0004	11·7927	11·5903	11·3929
15	13·7318	13·4710	13·2172	12·9702	12·7299	12·4959	12·2682	12·0465
16	14·5679	14·2747	13·9898	13·7131	13·4442	13·1828	12·9289	12·6819
17	15·3947	15·0675	14·7501	14·4423	14·1436	13·8538	13·5726	13·2996
18	16·2142	15·8496	15·4983	15·1581	14·8285	14·5092	14·1998	13·9000
19	17·0227	16·6210	16·2345	15·8607	15·4992	15·1494	14·8110	14·4836
20	17·8222	17·3820	16·9589	16·5504	16·1558	15·7748	15·4066	15·0508
21	18·6128	18·1327	17·6717	17·2274	16·7989	16·3866	15·9869	15·6023
22	19·3947	18·8732	18·3732	17·8919	17·4285	16·9823	16·5524	16·1383
23	20·1678	19·6037	19·0634	18·5442	18·0450	17·5651	17·1035	16·6593
24	20·9323	20·3242	19·7426	19·1845	18·6488	18·1344	17·6404	17·1658
25	21·6883	21·0350	20·4109	19·8130	19·2399	18·6905	18·1636	17·6581
26	22·4359	21·7361	21·0685	20·4299	19·8188	19·2337	18·6734	18·1367
27	23·1752	22·4277	21·7156	21·0355	20·3856	19·7643	19·1702	18·6019
28	23·9063	23·1100	22·3524	21·6299	20·9406	20·2826	19·6543	19·0541
29	24·6292	23·7829	22·9790	22·2134	21·4840	20·7889	20·1260	19·4937
30	25·3441	24·4468	23·5956	22·7862	22·0162	21·2834	20·5856	19·9209
31	26·0511	25·1017	24·2023	23·3484	22·5373	21·7664	21·0335	20·3363
32	26·7502	25·7476	24·7993	23·9003	23·0475	22·2383	21·4699	20·7400
33	27·4415	26·3848	25·3868	24·4420	23·5471	22·6992	21·8951	21·1324
34	28·1251	27·0134	25·9648	24·9737	24·0364	23·1494	22·3095	21·5139
35	28·8011	27·6334	26·5337	25·4957	24·5154	23·5891	22·7133	21·8847
36	29·4695	28·2451	27·0934	26·0081	24·9845	24·0187	23·1067	22·2451
37	30·1306	28·8484	27·6442	26·5110	25·4438	24·4383	23·4901	22·5955
38	30·7843	29·4436	28·1861	27·0046	25·8936	24·8481	23·8637	22·9361
39	31·4307	30·0306	28·7194	27·4892	26·3340	25·2485	24·2277	23·2672
40	32·0699	30·6098	29·2442	27·9649	26·7652	25·6395	24·5824	23·5890
41	32·7021	31·1810	29·7606	28·4318	27·1875	26·0215	24·9281	23·9018
42	33·3271	31·7445	30·2687	28·8901	27·6010	26·3947	25·2649	24·2059
43	33·9453	32·3004	30·7688	29·3400	28·0058	26·7591	25·5930	24·5015
44	34·5565	32·8487	31·2608	29·7816	28·4023	27·1151	25·9128	24·7888
45	35·1610	33·3896	31·7449	30·2150	28·7905	27·4629	26·2244	25·0681
46	35·7587	33·9232	32·2213	30·6405	29·1706	27·8026	26·5281	25·3396
47	36·3498	34·4495	32·6901	31·0582	29·5428	28·1344	26·8239	25·6035
48	36·9343	34·9687	33·1514	31·4682	29·9073	28·4585	27·1122	25·8600
49	37·5123	35·4808	33·6053	31·8706	30·2642	28·7751	27·3932	26·1093
50	38·0838	35·9860	34·0519	32·2656	30·6136	29·0843	27·6669	26·3517
51	38·6491	36·4843	34·4915	32·6534	30·9558	29·3864	27·9337	26·5873
52	39·2080	36·9759	34·9239	33·0340	31·2909	29·6815	28·1936	26·8164
53	39·7607	37·4608	35·3495	33·4076	31·6190	29·9697	28·4468	27·0390

Table showing the Present Value of £1 per Annum, &c.  
(continued.)

Years.	1½ per Cent.	1½ per Cent.	1½ per Cent.	1½ per Cent.	2½ per Cent.	2½ per Cent.	2½ per Cent.	2½ per Cent.
54	40.3072	37.9392	35.7683	33.7743	31.9402	30.2512	28.6936	27.2554
55	40.8477	38.4110	36.1803	34.1343	32.2548	30.5262	28.9341	27.4658
56	41.3822	38.8765	36.5858	34.4876	32.5629	30.7948	29.1684	27.6703
57	41.9107	39.3356	36.9848	34.8345	32.8645	31.0572	29.3968	27.8690
58	42.4333	39.7885	37.3774	35.1750	33.1598	31.3135	29.6193	28.0622
59	42.9502	40.2353	37.7638	35.5092	33.4491	31.5639	29.8361	28.2500
60	43.4612	40.6760	38.1439	35.8372	33.7322	31.8084	30.0473	28.4326
61	43.9666	41.1107	38.5180	36.1592	34.0095	32.0473	30.2532	28.6101
62	44.4664	41.5395	38.8861	36.4753	34.2811	32.2807	30.4538	28.7826
63	44.9606	41.9626	39.2483	36.7856	34.5470	32.5086	30.6492	28.9502
64	45.4493	42.3798	39.6048	37.0901	34.8073	32.7312	30.8397	29.1132
65	45.9326	42.7915	39.9555	37.3891	35.0622	32.9487	31.0263	29.2717
66	46.4105	43.1975	40.3006	37.6825	35.3118	33.1611	31.2061	29.4257
67	46.8831	43.5980	40.6402	37.9706	35.5563	33.3686	31.3823	29.5754
68	47.3504	43.9931	40.9744	38.2533	35.7956	33.5713	31.5540	29.7209
69	47.8125	44.3828	41.3032	38.5309	36.0300	33.7693	31.7213	29.8624
70	48.2695	44.7673	41.6267	38.8033	36.2595	33.9629	31.8844	29.9999
71	48.7214	45.1465	41.9451	39.0708	36.4842	34.1516	32.0432	30.1335
72	49.1683	45.5206	42.2584	39.3333	36.7042	34.3361	32.1980	30.2634
73	49.6102	45.8896	42.5667	39.5909	36.9197	34.5163	32.3489	30.3897
74	50.0471	46.2536	42.8701	39.8439	37.1306	34.6924	32.4959	30.5125
75	50.4793	46.6127	43.1686	40.0921	37.3372	34.8644	32.6391	30.6318
76	50.9066	46.9669	43.4623	40.3358	37.5395	35.0323	32.7786	30.7478
77	51.3291	47.3163	43.7514	40.5751	37.7376	35.1964	32.9146	30.8606
78	51.7470	47.6610	44.0358	40.8099	37.9315	35.3567	33.0471	30.9702
79	52.1602	48.0010	44.3157	41.0404	38.1215	35.5133	33.1763	31.0767
80	52.5688	48.3363	44.5911	41.2666	38.3074	35.6662	33.3021	31.1803
81	52.9729	48.6672	44.8620	41.4887	38.4895	35.8166	33.4247	31.2810
82	53.3725	48.9935	45.1287	41.7067	38.6678	35.9615	33.5441	31.3788
83	53.7676	49.3154	45.3911	41.9207	38.8424	36.1040	33.6605	31.4739
84	54.1583	49.6330	45.6493	42.1307	39.0134	36.2432	33.7740	31.5664
85	54.5447	49.9462	45.9034	42.3369	39.1808	36.3792	33.8845	31.6563
86	54.9268	50.2552	46.1534	42.5393	39.3447	36.5121	33.9922	31.7436
87	55.3046	50.5600	46.3994	42.7380	39.5052	36.6418	34.0972	31.8286
88	55.6783	50.8607	46.6415	42.9330	39.6624	36.7686	34.1994	31.9111
89	56.0477	51.1572	46.8797	43.1244	39.8163	36.8924	34.2991	31.9913
90	56.4131	51.4498	47.1141	43.3123	39.9670	37.0133	34.3961	32.0693
91	56.7744	51.7384	47.3447	43.4967	40.1146	37.1314	34.4908	32.1452
92	57.1317	52.0231	47.5717	43.6778	40.2591	37.2468	34.5829	32.2189
93	57.4850	52.3039	47.7950	43.8555	40.4005	37.3595	34.6728	32.2905
94	57.8344	52.5809	48.0148	44.0299	40.5391	37.4696	34.7603	32.3601
95	58.1799	52.8542	48.2310	44.2012	40.6747	37.5772	34.8456	32.4278
96	58.5215	53.1237	48.4438	44.3692	40.8076	37.6822	34.9287	32.4936
97	58.8594	53.3896	48.6532	44.5342	40.9377	37.7848	35.0097	32.5576
98	59.1934	53.6519	48.8592	44.6962	41.0650	37.8851	35.0886	32.6198
99	59.5238	53.9106	49.0620	44.8551	41.1897	37.9830	35.1655	32.6802
100	59.8505	54.1658	49.2615	45.0112	41.3119	38.0786	35.2405	32.7390
Perp.	88.8888	72.7272	61.5384	53.3333	47.0588	42.1052	38.0952	34.7826

Our readers are indebted to Mr. PETER HARDY for this Table.

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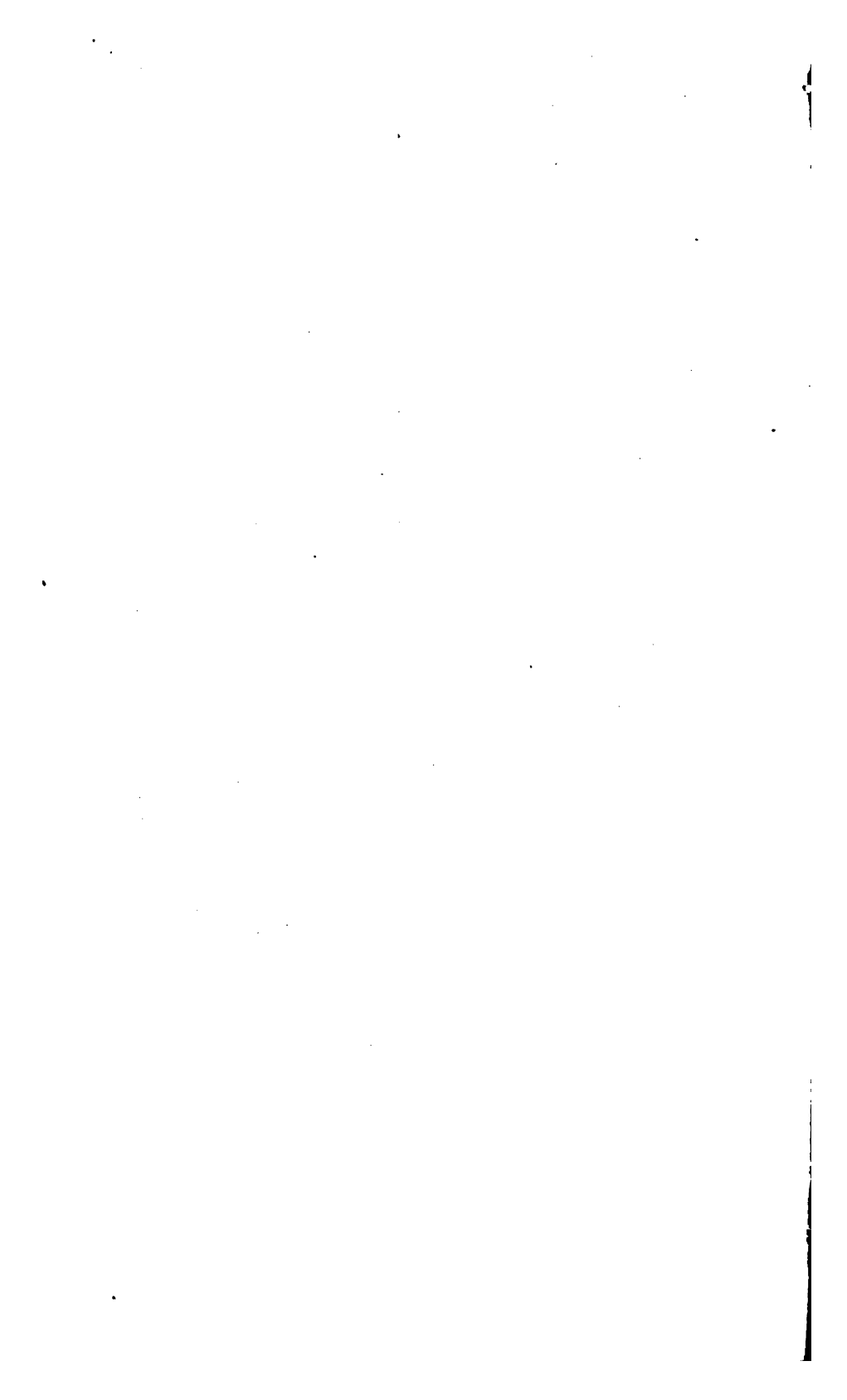
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